

Five-Year Review Report

Second Five-Year Review Report

SCRDI - Bluff Road Superfund Site
Richland County, South Carolina



United States Environmental Protection Agency
Region 4
Atlanta, Georgia

September 2008

Approved by:

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Date:

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List of Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
AST	Above-ground storage tank
BGS	Below Ground Surface
BRA	Baseline Risk Assessment
BQL	Below Quantitation Limits
CATOX	Catalytic Oxidation
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
ERM	Environmental Resources Management, Inc.
ESD	Explanation of Significant Differences
FS	Feasibility Study
GETS	Groundwater Extraction and Treatment System
GPM	Gallons Per Minute
GWCC	Ground Water Cleanup Criteria
GWCG	Ground Water Cleanup Goal
GWRS	Ground Water Recovery System
HASP	Health and Safety Plan
MDL	Method Detection Limit
MCL	Maximum Contaminant Levels
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PLC	Programmable Logic Controller
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objectives
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SCDHEC	South Carolina Department of Health and Environmental Control
SCRDI	South Carolina Recycling and Disposal, Inc.
SVE	Soil Vapor Extraction
SVOCs	Semi-Volatile Organic Compounds
USEPA	U.S. Environmental Protection Agency
VOCs	Volatile Organic Compounds

EXECUTIVE SUMMARY

This is the second Five-Year Review of the ongoing remedy. The results of this Five-Year review indicate that the remedy is expected to be protective of human health and the environment.

The SCRDI-Bluff Road Site (or 'the site' or 'SCRDI site') is located in Richland County, South Carolina about ten miles south of Columbia along State Highway 48, also known as Bluff Road.

The site is located in a rural area although about 1200 people work immediately across the street from the site at the large Westinghouse Nuclear Fuel Facility.

In 1975, the site became a marshalling center for the Columbia Organic Chemical Company. Site records indicate that the site's operator used the title SCRDI beginning in 1976. The site was intended to store, recycle, and dispose of chemical wastes from a variety of sources. The waste chemicals were stored at the site in drums which leaked and ruptured.

The investigation of the soils and groundwater quality in 1980 and later remedial investigations indicated that the soils and groundwater had been impacted by the waste chemical releases.

Site remediation was required for the shallow soils on the site property and the shallow groundwater aquifer beneath the site and surrounding properties.

The soil remediation has been completed. A Soil Vapor Extraction (SVE) system was constructed, operated and functioned as designed, and has been decommissioned. Site soils have been eliminated as a continuing source of contamination via leaching to the surficial aquifer and pose no threat to human health and the environment. The USEPA approved the soil remedy as complete in March 1997 and the system was removed from the site in April 1997. The remedy is considered a permanent remedy, and no further action is required for soils remediation.

The groundwater remedial action consists of a pump and treat system and this system is currently operating and is protective of human health and the environment. The groundwater treatment system and remedial actions were constructed and are functioning as designed, and are operated and maintained in a safe and appropriate manner.

The ongoing groundwater remediation is currently protective of human health and the environment.

The Health and Safety Plans and the Contingency Plan are in place and sufficient to control risks, and are being properly implemented.

Accordingly, the remedy for the site is expected to be protective of human health and the environment in the future.

Five – Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): SCRDI – Bluff Road		
EPA ID (from WasteLAN): SCD000622787		
Region: 4	State: South Carolina	City/County: Columbia / Richland
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input type="checkbox"/> Complete		
Multiple OUs? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Construction completion date: 09/08/1998	
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
Author name: Steven Sandler		
Author title: Remedial Project Manager	Author affiliation: U.S. EPA, Region 4	
Review period:** 11/01/2007 to 09/29/2008		
Date(s) of site inspection: 15 April 2008		
Type of review: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div> <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> Regional Discretion </div> <div> <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL State/Tribe-lead </div> <div> <input type="checkbox"/> NPL-Removal only </div> </div>		
Review number: <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
Triggering action: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div> <input type="checkbox"/> Actual RA Onsite Construction at OU # _____ <input type="checkbox"/> Construction Completion <input type="checkbox"/> Other (specify) </div> <div> <input type="checkbox"/> Actual RA Start at OU# _____ <input checked="" type="checkbox"/> Previous Five-Year Review Report </div> </div>		
Triggering action date (from WasteLAN): 29 April 2003		
Due date (five years after triggering action date): 29 April 2008		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

I. INTRODUCTION

This report documents the results of the second Five-Year Review of the SCRDI-Bluff Road Superfund Site to determine whether the remedial actions at this site remain protective of human health and the environment.

The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, any issues identified during the review will be presented, along with recommendations to address them.

This report is prepared as required by statute, section 121 of the 1980 CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and Section 300.430 (f) (4) (ii) of the National Oil and Hazardous Substance Contingency Plan (NCP).

This statute requires that periodic reviews be conducted at least every five years for sites where hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure following the completion of all remedial actions.

CERCLA §121 states:

If the president selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review, it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP. 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This Five-Year review is required because hazardous substance, pollutants, or contaminants remain at the site, in the shallow site groundwaters, at levels above that allowed for unlimited use and unrestrictive exposure.

This is the second Five-Year Review for the SCRDI-Bluff Road site. This is considered a 'policy' Five-Year Review because although the selected remedy for groundwater, upon completion, will not leave hazardous substances, pollutants, or contaminants remaining on Site above levels that allow for unlimited use and unrestricted exposure, the remedial action requires more than five years or more to complete. The trigger for this policy review is the passage of five years since the completion of first Five-Year Review report.

This second Five-Year Review was conducted by the USEPA with the support of the Potentially Responsible Parties (PRPs), in accordance with applicable guidelines. While the PRPs and PRP's contractor de maximis, inc. provided data EPA as the lead agency managed the preparation of the Five-Year Review, prepared the protectiveness statement and finalized the Five-Year Review Report.

The next Five-Year Review for the Site will be due in September 2013.

The remedy for soil contamination has been completed.

There is continuing remedial work at the site and surrounding properties for the groundwater remediation which includes operations and maintenance activities intended to maintain the integrity of the groundwater remedy, and long-term monitoring to evaluate the effectiveness of the remedy. The groundwater remedy is a pump and treat system. The contaminated groundwater is pumped by submersible pumps to a treatment building, treated to drinking water standards, as required by state permits, and re-injected into the surficial aquifer.

II. SITE CHRONOLOGY

Table 1

Chronology of Events / Date

	1980	SCRDI drum storage site closed upon discovery by SCDHEC of site soils and groundwater contamination
	1982-1983	Surficial clean-up of all site drums and surface materials completed
Dec	1982	Site proposed to be listed on National Priorities List (NPL)
Sept	1983	Site listed on NPL
July	1984	Start of initial Remedial Investigation / Feasibility Study (RI/FS) by SCDHEC
Sept	1987	Completion of initial RI/FS by SCDHEC
Nov	1984	Site Inspection
Feb	1988	Administrative Order on Consent issued to the Potentially Responsible Parties (PRPs)
July	1990	Pilot tests confirm Soil Vapor Extraction (SVE) system will remediate contaminated site soils
Sept	1990	RI/FS completed by some of the PRPs
Sept	1990	EPA issues Record of Decision (ROD)
Mar	1992	Explanation of Significant Differences (ESD) issued by USEPA
Aug	1992	Removal Assessment
Sept	1992	EPA enters into Consent Decree with the remaining PRPs to complete soils and groundwater remediation
	1993	Remedial Design Work Plan is completed to proceed with design of the groundwater treatment system for clean-up of contaminated groundwater
Sept	1993	Submittal of SVE system design for soils remediation
May	1994	USEPA conducts public meeting
June	1994	USEPA/SCDHEC approve SVE system design and issue ESD #2
July	1994	Construction begins for the SVE system to clean contaminated soils
Oct	1994	SVE operations begin
June	1995	EPA enters into a Consent Decree with the PRPs who conducted the earlier RI/FS
Dec	1995	Remedial Design (RD) is approved for the groundwater remediation system
Dec	1995	SVE yearly operations report submitted to USEPA / SCDHEC

Table 1

**Chronology of Events / Date
Cont'd**

Dec	1995	SVE pulsed operations begin
Feb	1996	SVE pulse test report submitted to USEPA / SCDHEC
Apr	1996	Preliminary soil borings report submitted to USEPA / SCDHEC
May	1996	Public meeting at Hopkins Community Center with USEPA and SCDHEC to discuss site work and groundwater remedy
June	1996	Confirmatory soil borings completed
Aug	1996	Construction of the Groundwater Pump and Treat System is completed and operations begin for contaminated groundwater recovery
Aug	1996	SVE Remedial System Soil Closeout Report for soils remediation submitted
Feb	1997	USEPA and SCDHEC approve SVE Closeout Report and concur the soil remedy actions are completed. Decommissioning plan for SVE system approved.
Mar	1997	Completed SVE decommissioning activities
Apr	1997	Submittal of SVE decommissioning report to USEPA / SCDHEC
Nov	1997	Capture Zone Evaluation Report submitted for groundwater pump and treat system
Jan	1998	Southwest Area Investigation Report submitted for groundwater remedy
Sept	1998	EPA issues Preliminary Close Out Report
Apr	2003	EPA approves the first Five-Year Review Report, which was prepared by the United States Army Corps of Engineers

III. BACKGROUND

Physical Characteristics

The SCRDI-Bluff Road Site (or 'the site' or 'SCRDI site') is located in Richland County, South Carolina about ten miles south of Columbia along State Highway 48, also known as Bluff Road. Refer to Figure A-1 for general site location in Attachment A.

The Site is a rectangular parcel of land measuring 133 feet of frontage on Bluff Road and extends back approximately 1300 feet from the road. The site is relatively level with ground elevation varying from approximately 139 feet near the highway to 134 feet above mean sea level at the rear of the property. The front portion of the site extending approximately 600 feet from the road is cleared and has been used for various industrial and commercial purposes. The Bluff Road Site covers four acres, which is a single rectangular parcel of land. The front half of the property is cleared, and was used for various industrial and commercial purposes. The site is directly across Bluff Road from the entrance to the Westinghouse Nuclear Fuel Facilities where nuclear fuel assemblies are fabricated for commercial nuclear reactors.

The Site and surrounding area soils identified by the Richland County Soil Survey include loams, which are mixtures of sand, silt and clay. The specific soil types that exist at the site and vicinity are the Orangeburg loamy sand, Persanti fine sand loams, Smithboro loam, and Cantry loam.

Most of the nearby property and rear portions of the site, as well as the surrounding properties, have been classified by the USACE as wetlands.

Surface water flow from the Site property and the adjacent study area is directed to one of two main drainage channels, a drainage ditch parallel to Bluff Road that is a tributary to Myers Creek, and Myers Creek itself. Groundwater flow is to the south-southeast.

The stratigraphy of the site area can be summarized into four hydrologically connected water-bearing units. The hydrogeologic units are described as follows:

- A shallow, surficial aquifer in the Okefenokee terrace, underlain by a clay aquitard, part of the Black Creek Formation
- A deep aquifer consisting of sand and clay, also part of the Black Creek Formation, underlain by another aquitard and sandy clay
- The deepest aquifer, the Middendorf Formation, consisting of sand, silt, and clay (commonly referred to as the Tuscaloosa Aquifer)
- The crystalline pre-Mesozoic basement which has virtually no primary porosity but possibly has significant high secondary fracture porosity.

The shallow aquifer typically extends to a depth of 45 to 50 feet below ground surface (BGS) and is composed primarily of sand with varying amounts of silt and clay, and sorting ranges from well to poor. This aquifer is classified as a potable aquifer by the State of South Carolina. The shallow aquifer is semi-confined by a silt and clay layer that ranges in maximum depth of 5 to 15 feet BGS. The water table in the shallow aquifer general exists 10 to 15 feet BGS. The overall ground water flow is generally to the southeast and south.

The deep aquifer is separated from the shallow aquifer by a clay and silt unit, which ranges in thickness from 1.5 to 25 feet BGS. This partial confining unit is thinnest in the vicinity of MW-6 and MW-7 and thickens to the south and west (Figure A-4). The lithology of the deep aquifer is similar to that of the shallow aquifer, though clay-rich layers are more common. Both the clay aquitard and the deep aquifer are thought to be units in the Black Creek Formation.

The gradient of the shallow aquifer potentiometric surface is about 0.003 near Bluff Road and changes to less than 0.001 in the vicinity of MW-4, MW-6, MW-8, and MW-1 (Figure A-4). The Remedial Investigation data indicate that there is a downward head in the surficial aquifer and it could recharge the deeper aquifer. Flow patterns of the shallow aquifer water table are subject to local influences. The gradient of the potentiometric surface in the deep aquifer is 0.0003 ft/ft toward the south based on water level data gathered from the four wells installed by the IT Corporation.

Although not typically included as part of the Site by earlier documents, the Site also effectively includes the adjacent, and similarly dimensioned, 4 acre parcel. The shallow soils on this property were contaminated and were a part of the soils remediation. This parcel is also the location of a recovery well and the location of the present groundwater treatment system building for the ongoing groundwater remediation.

Land and Resource Use

The site is located in a rural area. The nearest residence lies about one mile away.

Approximately 3500 people live within four miles of the site. About 1200 people work immediately across the street from the site at the large Westinghouse Nuclear Fuels Facility.

The site and nearby properties are rural and wooded. Property uses for adjacent properties to the site are currently for hunting and timber production, with the exception of the heavy industrial development at the Westinghouse Nuclear Fuels Facility.

The residents in Hopkins along Lower Richland Boulevard and along Bluff Road, south of the Site, do rely on groundwater wells for water use.

All the private residential wells closest to the site in the community of Hopkins, along Lower Richland Boulevard, were sampled in 1994. The private residential wells along the south side of Bluff Road, and near Lower Richland Boulevard, were sampled in 1996. The data for all the private residential well samples shows that Site groundwater contaminants have not migrated to the residential wells.

History of contamination

The first reported commercial or industrial use of the Site was as an acetylene gas manufacturing facility. Two lagoons were constructed at the north end of the cleared area of the site to support acetylene manufacturing. Specific dates and other details regarding the facility operations are not available.

In 1975, the site became a marshalling center for the Columbia Organic Chemical Company. Site records indicate that the site's operator used the title SCRDI beginning in 1976, as the site was intended to store, recycle, and dispose of chemical wastes from a variety of sources.

The site was operated by South Carolina Recycling and Disposal Inc. (SCRDI), as a waste storage, recycling, and disposal facility for waste chemicals from 1976 to 1982. The waste chemicals were stored at the site in drums.

Initial response

In March 1980, USEPA conducted a site visit and saw a number of leaking storage drums. Samples of the drums contents and adjacent surficial soils were collected and analyzed. The analyses showed the presence of volatile organic and other chemical compounds.

An investigation of groundwater quality was performed by the SCDHEC in the fall of 1980. Results of the investigation indicated that groundwater had been impacted by the chemical releases. Chlorinated organic solvents and lead were detected in the groundwater in 1980 and sampling of groundwater in 1982 indicated that concentrations of organic compounds in groundwater were increasing. Operations at the SCRDI Site were shut down in 1982.

Surficial clean-up

Cleanup of the site surface was conducted in 1982 and 1983 under the direction of USEPA and SCDHEC. Over 7500 drums containing chemicals and numerous smaller containers of toxic, flammable, and reactive wastes were stored on the site from 1975 until it was closed in 1982; these containers were removed for proper disposal. Visibly contaminated soil and all above-ground structures were also removed and clean fill material was used to fill excavations and provide clean access road surfaces.

Summary of Basis for Taking Action

The initial soil and groundwater samples as well as the surficial clean-up indicated substantial contamination of site soils and groundwater by the hazardous waste operations of SCRDI.

Following a surficial cleanup in 1982 and 1983, groundwater and soil contamination remained at significant levels. Major soil contaminants included acetone, chloroform, 1,1,2,2-tetrachloroethane, toluene, chlorobenzene, and tetrachloroethane. Significant groundwater contaminants include acetone, 1,1-dichloroethane, 1,2 dichloroethene, chloroform and other volatile organic compounds (VOCs). In September 1983, the site was listed on the National Priorities List (NPL). The NPL is a list of priority releases for long term evaluation and remedial response, and was promulgated pursuant to section 105 of the CERCLA of 1980. The NPL is found in the NCP, Appendix B of 40 CFR part 300.

Summary of Site work leading to Soil and Groundwater Remedial Actions

Initial Remedial Investigation

Remedial Investigation (RI) work was begun in 1984. In 1986, Golder Associates was retained by SCDHEC to conduct a RI to determine the type, extent, and degree of soil and groundwater contamination on and around the site. The investigation included soil and groundwater sampling, a soil gas survey, and a subsurface geophysical survey. The extent of groundwater contamination was investigated by installing 25 monitoring wells and 10 borings were drilled for organic vapor analysis. Assessment of contaminants in the above ground storage tank (AST), soil, lagoon water and groundwater samples indicated 2-chlorophenol and phenol in the AST, VOCs in vadose zone soils, both samples from the lagoon indicated that VOCs were not detected in concentrations that exceeded the method detection limit (MDL). Of the 25 monitoring wells, three of the monitoring wells, were screened in deep strata that underlie the black plastic clay. Water sample analyses from the three deep wells, installed below the clay aquitard, indicated that VOCs were not detected above the respective MCLs. The 22 wells installed in the surficial sand aquifer, indicated that contamination was present throughout the thickness of the aquifer and was entirely VOCs, concentrations ranging the MCL to 10,238 ug/L

Final Remedial Investigation and Feasibility Study

In 1989, the RI was continued and involved the sampling of soil, surface water, sediments, ground water, and air. Sampling was conducted at the SCRDI site to define the characteristics and extent of contamination at the site. Nineteen monitoring wells were installed in the surficial aquifer to define the extent and characteristics of ground water contamination. The analytical results defined a contaminant plume approximately 1000 feet wide extending approximately 2200 feet southeast of the site.

Four monitoring wells were installed during the RI in the upper portion of the deep aquifer, below the clay aquitard. Analytical results of water extracted from these deep wells indicated that the deep aquifer had not been impacted by contamination. Based on the analysis of forty-two surface soil samples collected during the RI, two general areas of surface soil contamination were identified. The most significant area of surface soil contamination was found on the southwestern edge of the SCRDI site and encompassed approximately 350 feet x 200 feet (70,000 square feet). The second area of surface soil contamination was identified in the central portion of the SCRDI property (the dry lagoon area) at lower concentrations than those detected at the southwestern edge of the property. This second area encompassed approximately 100 feet x 100 feet (10,000 square feet).

Twenty-nine soil borings were sampled on and off the site to determine the extent of vadose zone contamination. Analytical results showed that elevated levels of VOCs were limited to the upper 7 feet of the unconsolidated zone with concentrations decreasing significantly with depth. The areas of detected elevated levels encompassed an area of approximately 400 feet x 250 feet (112,500 square feet), which overlapped the area of high contaminant concentrations in surface soil. In addition SVOCs were detected in the same limited areas, and low levels of pesticides/PCBs were detected in the subsurface soils. The wet lagoon water and sediment samples contained trace amounts of VOCs and SVOCs. Sediment metal concentrations were within background ranges with the exception of calcium. Samples of off-site surface water and surface water sediment indicated no site related contamination. Ambient air samples were also collected at the site. Toluene was detected in two out of three bag samples at concentration of 22 and 27 ppb. No other constituents were detected; air contamination was determined not to be significant at the site.

The RI/FS was finalized in March of 1990, and indicated cleanup alternatives for remaining soil and groundwater contamination. In May 1990, USEPA issued a Proposed Plan for the cleanup of the SCRDI Bluff Road Site. The Proposed Plan recommended thermal desorption for the cleanup of contaminated soils remaining at the site, and extraction and treatment for contaminated groundwater. During the public comment period on the Proposed Plan, comments were received that supported a different alternative, a Soil Vapor Extraction (SVE) system to clean-up the soils. Under USEPA oversight, a pilot scale test of the SVE system was conducted at the SCRDI Bluff Road Site in July and August 1990. The pilot test demonstrated that SVE was a feasible remedial technology for this site and was capable of achieving the required target soil-cleanup goals set in the ROD for the vadose zone. Concerns about the amount of clay in site soils and the effectiveness of SVE were satisfactorily addressed.

In addition to specifying SVE as the preferred alternative for treatment of the contaminated soils at the SCRDI-Bluff Road Site, the ROD specifies two options for the treatment of the extracted vapors. The ROD specifies that the extracted vapors will be run through a vapor/liquid separator and then finally treated either with vapor phase carbon adsorption, or by fume incineration.

Record of Decision, Explanation of Significant Differences, and Consent Decree

A ROD was signed for the site by USEPA on September 12, 1990, which identified SVE as the recommended remedial alternative for soils and groundwater extraction and treatment as the recommended alternative for groundwater.

Since the ROD was signed in September 1990, USEPA negotiated with over 100 potentially responsible parties (PRPs) that had hazardous wastes transported and disposed at the SCRDI-Bluff Road Site. The result of the negotiations was a Consent Decree whereby PRP's agreed to pay site cleanup and EPA oversight costs. Litigation with adjacent property owners over the PRP's and USEPA's access to property surrounding the site caused significant delays (over two years) in beginning remediation of the site.

An Explanation of Significant Differences (ESD) was signed in March of 1991. In the ROD, signed September 12, 1990, it was stated that a 5-year review would not apply to this site because "the remedy will not result in hazardous substances remaining on-site above health-based levels the five-year facility review will not apply ... ". The ESD signed in March 1991 determined that a 5-year review was applicable for the site, because soil and groundwater will be contaminated above health based risk levels until the remedy, projected to take two years from the ROD for contaminated soil remediation and 16 years for groundwater remediation, is fully implemented and deemed successful.

The implementation of the RD/RA was based on a Consent Decree (1992), agreed to by a group of potentially responsible parties, who are referred to as the Performing Settlers.

The second ESD, signed June 22, 1994, marked the completion of the design for the soil remediation. The ESD was issued to describe the rationale for the change for the selection of a catalytic oxidizer (CATOX) unit over vapor phase carbon adsorption for the soils remediation.

Construction of the soil remedy was started and completed in 1994. The soil cleanup goals were achieved in late 1996. USEPA approved the soil remedy as complete in March 1997 and the system was removed from the site in early April 1997. The approval of the completion of soil remedy was made by the EPA in March 1997. The Preliminary Close Out Report signed by the EPA on September 9, 1998 indicates the same and documents the operational status and construction completion of the groundwater remedy at that time.

Soil Remediation Established Clean-up Levels

The chemical-specific soil target cleanup goals set in the ROD are presented in the following table. This table is equivalent to Table 14 of the ROD. The goals for VOCs are included in the following soil cleanup criteria table.

Table 2
Soil Cleanup Criteria

Parameter	Target Cleanup Level (ppm)	Parameter	Target Cleanup Level (ppm)
Acetone	1.1	Chlorobenzene	0.956
Carbon Tetrachloride	0.053	Tetrachloroethene	0.053
Chloroform	0.021	1,2-Dichloroethene	0.12
1,1,1-Trichloroethane	1.03	Total Xylenes	0.695
Methylene Chloride	0.017	Vinyl Chloride	0.003
1, 1-Dichloroethane	0.006	1,1-Dichloroethene	0.013
2-Butanone	0.055	Benzene	0.012
Trichloroethene	0.018	1,2-Dichloroethane	0.005
1,1,2,2-Tetrachloroethane	0.001	2-Chlorophenol	0.55
Ethylbenzene	0.223	Phenol	3.95
4-Methyl-2-Pentanone	0.55	1,1,2-Trichloroethane	0.001
Toluene	0.174		

Groundwater Remedial Design Investigation

Environmental Resources Management, Inc. (ERM) performed a Remedial Design (RD) Investigation to collect the data necessary to design a groundwater remediation system for the SCRDI-Bluff Road Site and adjacent area (Figure A-3). The results of the RD investigation indicated the following.

A design consisting of recovery wells along the plume and re-injection wells up-gradient of the capture zone was preferred. There is no data to indicate that the aquitard is absent from any portion of the site or adjacent area.

Additional monitoring wells would be needed (and have been installed) down-gradient of the recovery wells to verify the plume limits and provides sentinel wells for monitoring during recovery and treatment efforts.

Solute transport modeling demonstrated that the elapsed time for down-gradient cleanup might be achieved in as short as ten years, assuming no continuing source of VOCs.

The air stripper and activated carbon treatment of organic compounds is predicted to result in discharge of effluent below maximum contaminant level concentrations, and thus will not degrade groundwater quality when re-injected into the surficial aquifer.

Metals concentrations are likewise expected to be less than the Ground Water Cleanup Goal (GWCG) or background concentrations. The analysis of total and dissolved metals results indicated that only three monitoring wells had concentrations that exceeded a GWCG and significantly exceeded background quality for a metal (manganese or iron, which are secondary standards for taste and odor);

The groundwater remedial system construction was completed in August 1996. Operation of the groundwater recovery and treatment system is ongoing.

Groundwater Target Cleanup Levels

The groundwater cleanup goals are based on Safe Drinking Water Act (SDWA) maximum contaminant levels (MCLs) detailed in Table 13 of the ROD and listed in Table 3 of this document. The goals were based on USEPA maximum contaminant levels for drinking water or on risk-based criteria assuming groundwater use as a drinking water supply. Goals were established for 22 volatile organic compounds and 11 metals.

The most limiting of these goals are those for 1,1,2,2-tetrachloroethane (0.6 Φ g/L), carbon tetrachloride (5 Φ g/L) and tetrachloroethene (5 Φ g/L), in that the attainment of GWCG for these three VOCs defines the limit of the VOC plume.

The ROD also includes Target Cleanup Levels for metals of concern based on earlier groundwater analysis and these are listed in Table 3 of this document.

There was an additional groundwater sampling event for metal analysis in February 1995. The additional sampling indicated that none of the metals exceed the Target Cleanup Levels except iron and manganese, which are naturally occurring according to background data. The additional groundwater sampling data is detailed in the Supplemental Ground Water Investigation Report, April 19, 1995 prepared by ERM, Inc.

Table 3
Groundwater Cleanup Criteria

Volatiles Compound	Target Cleanup Level (ppb)	Volatiles Compound	Target Cleanup Level (ppb)
Carbon Tetrachloride	5	Trichloroethene	5
Acetone	1100	1,1,2,2 Tetrachloroethane	0.6
Chloroform	20.9	Ethylbenzene	700
Benzene	5	1,2-Dichloroethane	5
1,1,1-Trichloroethane	200	4-Methyl-2-Pentanone	550
Methylene Chloride	17	Toluene	2000
1,1-Dichloroethane	5	Chlorobenzene	100
1,1-Dichloroethene	7	Tetrachloroethene	5
1,2-Dichloropropane	5	1,2-Dichloroethene	70
2-Butanone	550	Total Xylenes	10,000
1,1,2-Trichloroethane	2.2	2-Chlorophenol	55

Metals	Target Cleanup Level (ppb)	Metals	Target Cleanup Level (ppb)
Iron	300	Zinc	5000
Manganese	50	Lead	5
Barium	1000	Arsenic	50
Cadmium	5	Selenium	10
Chromium	50	Mercury	2
Copper	1000		

IV. REMEDIAL ACTIONS

Remedy Selection

The selected remedy for the site remediation addressed two areas.

Remediation of site soils

Remediation of the site and off-site shallow groundwater aquifer

Soils remediation - Soil Vapor Extraction (SVE)

An SVE System was selected as the soils remedy upon completion of the Site pilot test in 1990.

The SVE system included a network of vacuum (air withdrawal) wells in the shallow unsaturated zone. A large air vacuum pump applied a vacuum through a PVC pipe manifold system to the series of wells to remove the organic compounds from the Site soils.

The PRPs submitted a draft design for the SVE system on September 3, 1993, in accordance with requirements of the Consent Decree. USEPA and SCDHEC reviewed the design and forwarded comments. Of the two options identified in the ROD for SVE vapor treatment, the draft design and its revisions selected incineration of the extracted vapors by a catalytic oxidizer, or CATOX unit. The pilot test demonstrated that SVE was a feasible remedial technology for this site and was capable of achieving the required target soil cleanup goals set in the ROD in the vadose zone. Concerns that USEPA had regarding the amount of clay in site soils and the effectiveness of SVE were satisfactorily addressed.

Groundwater remediation - Pump and Treat

A system of recovery wells was selected to pump the contaminated groundwater back to a treatment building where the contaminated groundwater was cleaned to drinking water standards, and by SCDHEC permit, would be re-injected into the groundwater, upgradient from the site.

Groundwater treatment of the extracted groundwater would include Air-stripping, and liquid phase granular activated carbon (GAC) system;

Groundwater remediation will be performed until all contaminated water meets the cleanup goals.

The ROD noted that the purpose of remedial action at the SCRDI-Bluff Road Site is to

mitigate and minimize contamination in groundwater, and to reduce potential risks to human health and the environment. The following clean-up objectives were determined based on regulatory requirements and levels of contamination found at the Site; these goals of system operation are outlined below and in Section 1.4 of the O&M Plan:

Recovery of groundwater through a system consisting of eight groundwater recovery wells;

Capture groundwater to contain the Site VOC plume down-gradient to MW-21B and southwest to Bluff Road;

Operate the system in a manner that is efficient, safe and protective of human health and the environment;

To prevent off-site movement of contaminated groundwater;

Treat groundwater to meet the discharge limits established by the SCDHEC Underground Injection Control Permit;

Treatment of groundwater by air stripping of VOCs, pumping through a duplex basket filter to remove suspended solids, by removing any remaining VOCs by capturing with granular activated carbon;

Injection of the treated groundwater to the aquifer in a series of 10 wells, which are located upgradient of the contaminant plume in a northwesterly direction from the treatment plant; and

Treating air emissions from volatilization as needed to meet ambient air quality standards

Monitoring groundwater and air onsite.

To restore contaminated groundwater to levels protective of human health and the environment;

Attain the Groundwater Cleanup Criteria established in the ROD

Remedy Implementation

Soil Remedy Implementation

Construction of the soil remedy was started and completed in 1994. The soil cleanup goals were reached in late 1996. USEPA approved the soil remedy as complete in March 1997 and the system was removed from the site by early April 1997.

The SVE soil remedy was implemented and performed in accordance with the ROD and the approved remedial design criteria and specifications. Confirmatory vadose zone soil sampling verified that the ROD specified target cleanup goals have been achieved and that all soil remedy actions specified in the ROD have been implemented. Site soils have been eliminated as a continuing source of contamination via leaching to the surficial aquifer and pose no threat to human health and the environment.

The total post-ROD cost for the soils remediation effort was \$1,770,000. This was the cost associated with the work by the SVE system contractor (Terra Vac, Inc). Refer to Table 1 of this report for the time line of soil remediation and SVE system operations. Refer to the SCRDI Bluff Road Site SVE Remedial System Soil Closeout Report, August 23, 1996, for more details concerning: SVE remedial system performance criteria; SVE system installation and construction activities; SVE systems operations and maintenance; pre and post-operations confirmatory sampling results; clean-up goal verification; cessation of SVE system operations; SVE well abandonment; and manifold dismantling and disposal.

Groundwater Remedy Implementation

The ground water recovery system at the Site was constructed in 1996 and operation began in August 1996. Refer to Attachment C for photographs of treatment system instrumentation, equipment, etc.

The system consists of eight ground water recovery wells (RW-1 to RW-8) and ten injection wells (IW-1 to IW-10) (Figure A-3). All wells were installed in the shallow, unconfined, alluvial aquifer system. All of the extracted groundwater is treated by air stripping, then granular activated carbon, and then re-injected to the shallow aquifer via the ten injection wells.

As outlined in the Capture Zone Evaluation Report of April 1997 prepared by ERM, Inc., the plumes can be described in terms of a northern plume lobe or section and the southern plume section. The distinction between these plume sections is defined by the change in ground water flow direction just south of RW-5 and is not related to a change in the chemical nature of the plume. Recovery wells RW-1 through RW-5 are located along the axis of the northern plume. Recovery wells RW-6 through RW-8 are located along Bluff Road at the southwest limit of the Site Access Area. These three wells were designed to

perform as a picket line for hydraulic capture. Recovery wells RW-6 and RW-7, by themselves, could contain the limits of both the northern and southern plume sections, based on the balance between pumping rate and amount of groundwater flowing naturally in this area. The well pumps are submersible, centrifugal type located in the wells. The total planned startup recovery/injection pumping rates, as outline in the O&M Manual was 160 gallons per minute. The well pumps transfer the groundwater from the wells through a duplex basket filter into a 9,000-gallon influent equalization tank. From the equalization tank, a horizontal centrifugal pump transfers the water to two air strippers, in parallel, for removal of the bulk of VOCs. Effluent from the air strippers is transferred via a progressive cavity pump through a duplex basket filter and two granular activated carbon vessels, in series. The groundwater effluent, now fully treated to groundwater drinking standards by the air strippers and GAC vessels is re-injected into the groundwater.

The entire treatment system is housed inside a prefabricated metal building located approximately 400 feet from Bluff Road. A sump is cast into the floor of the building with an approximate working volume of 200 gallons and a permanent sump pump is in place. The sump pump discharges to the influent equalization tank. An electrical distribution panel and programmable logic controller (PLC) and alarm system are in the building. The treated groundwater is currently sampled monthly to satisfy the requirements of the SCDHEC groundwater re-injection permit.

The Site groundwater is currently sampled semi-annually to monitor the effectiveness of the groundwater recovery system and the progress of the remediation of the contaminated groundwater.

System Operations and Maintenance (O&M)

As previously mentioned, the soils remediation is complete and the present system O&M consists of operating and maintaining the groundwater recovery and treatment system.

The groundwater recovery and treatment system is currently maintained and operated by a qualified and certified operator from O&M, Inc. A site visit is usually made every day of the week, and on the weekends if necessary. The system is also capable of operating without daily inspection as the system design includes interlocks and safety devices that will shut down the system to prevent an accidental release and prevent damage to the equipment while operating unattended.

The instruments include level control to start and stop pumps, throttling valves to set system flow rate; flow measurement and recording; flow and pressure detection to detect upset conditions, and pressure relief devices in the event of upset conditions.

Permits for ongoing groundwater remediation

The SCDHEC issued permit (No.17,908-IW) for the construction of the site groundwater treatment system on 7 December 1995. According to the permit, the facility is classified in Group I-PC, requiring the operation of the system of a Grade D Operator.

The construction permit also provided for the submission of a Best Management Practices Plan to avoid and mitigate the release of toxic or hazardous substances as defined in Parts 117 and 122 of 40 Code of Federal Regulations (CFR). The O&M Plan has a Best Management Practices Plan.

The SCDHEC approved the operation of 10 Class VA-I (aquifer remediation) injection wells at the referenced site as per their inspection of April 15, 1996 and Injection Well Operating Permit #149M. It was required by the permit that the wells be operated in accordance with Supplemental Groundwater Sampling Report of April 19, 1995, the draft O&M manual submitted on February 29, 1996 and May 24, 1996 correspondence of de maximis, inc. to SCDHEC representatives.

The SCDHEC has subsequently approved a revised Injection Operating Permit #149M on March 6, 2007 which provided the same requirements as before except for the deletion of the requirement to analyze for 2 - chlorophenol, the only SVOC in the original permit. The SVOC compound 2-chlorophenol was only observed in the initial months of operation at levels below the permitted level, and was not observed after two years.

The treated groundwater is sampled monthly and the analytical data is reported in the Site monthly progress report submitted to the EPA and SCDHEC. The injection and discharge limits for the re-injection wells for VOCs are listed in Table 4.

An air operating permit was issued on 24 April 1996 by SCDHEC for the air discharge from the air strippers. The permit requires the operator to maintain a file of operational activities each month, including a description of work completed in the previous reporting period and anticipated work in the upcoming period, corrective actions taken and modification of system operation and schedule. The re-injected groundwater is sampled monthly and the analytical data is used to report the air emissions in the Site monthly progress report submitted to the EPA and SCDHEC. Monthly site progress reports are available at the site.

Table 4
Treated Water Injection and Discharge Limits.

VOC compounds	Injection Well Discharge Limit (Φ g/L)
Carbon Tetrachloride	5
Acetone	1100
Chloroform	21
Benzene	5
1,1,1-Trichloroethane	200
Methylene Chloride	17
1,1-Dichloroethane	5
1,1-Dichloroethene	7
1,2-Dichloropropane	5
2-Butanone	550
1,1,2-Trichloroethane	2
Trichloroethane	5
1,1,2,2-Tetrachloroethane	0.6
Ethylbenzene	700
1,2-Dichloroethane	5
4-Methyl-2-Propane	550
Toluene	2000
Chlorobenzene	100
Tetrachloroethane	5
1,2-Dichloroethene	70
Total Xylenes	10000

Table 5
Air Discharge Limits

Parameter	Discharge Limit (lb / hour)	Discharge Limit (tons / yr)
Carbon Tetrachloride	0.03	0.131
Chloroform	0.261	1.143
Methylene Chloride	0.083	0.364
Ethylidene Dichloride	0.125	0.548
Methyl Ethyl Ketone	0.083	0.364
Trichloroethene	0.042	0.183
1,1,2,2-Tetrachloroethane	0.083	0.364
Ethylbenzene	0.042	0.183
Methyl Isobutyl Ketone	0.042	0.184
Toluene	0.114	0.499
Chlorobenzene	0.021	0.092
Tetrachloroethene	0.083	0.364
Xylene	0.042	0.184
Vinyl Chloride	0.038	0.166
Vinylidene Chloride	0.057	0.25
Benzene	0.03	0.131
Ethylene Dichloride	0.053	0.232
1,1,2-Trichloroethane	0.055	0.241
Phenol	0.016	0.07
Carbon Disulfide	8.33E-05	3.65E-04
Hydrochloric Acid	1	4.38

Personnel

The permit for the operations of the groundwater treatment system classifies the facility in Group I-PC, requiring the operation of the system by a Grade D certified operator. As required by the permit, the groundwater treatment system operator is a Grade D certified operator and has demonstrated the ability to perform the needed operational tasks required by the system. The operator is also certified in accordance with CFR 1910.120 for hazardous waste personnel. The staff is on call 24 hours per day, 7 days a week to respond to any emergencies.

This second five-year review verified that the treatment system operator, Scott Ingles, is licensed by the State of South Carolina as a level D operator and that he is knowledgeable of the groundwater treatment system functions, operations and maintenance schedules. Mr. Ingles is also certified in accordance with CFR 1910.120 for hazardous waste personnel.

Site Access and Site Control

The main gate controls access by vehicles. The groundwater treatment building is locked when unoccupied. The building is provided with a security system to monitor for burglar entry and fire. A trouble alarm from any point on the security system will cause an alarm, which will activate the interlocks, shutdown the system operation, and the auto-dialer will alert an operator. The building is only unlocked and opened during routine site visits, inspections, sampling events or ongoing maintenance. All personnel entering the site are required to report to the office and fill out the site entry log. In addition, personnel performing work on site are required to participate in a brief safety meeting, and review the approved Site Health and Safety Plan. Any site visitors are escorted by an O&M, Inc. personnel. Monitoring wells, recovery wells, and injection wells are also locked.

Although not a part of any plan for the Site work, since 9/11, the security personnel at the Westinghouse Nuclear Fuel Rod Manufacturing Facility provide a de-facto unscheduled security watch along Bluff Road during their routine perimeter inspection. The entrance to the Westinghouse facility is across the road from the Bluff Road Site and their perimeter inspection of Bluff Road provides some measure of additional security along this common boundary.

Inspection Procedures

Inspection procedures are in place to insure uninterrupted operation of the groundwater recovery, treatment and injection system. Inspections are required on a weekly basis, and usually conducted daily, to monitor the operation and condition of the recovery, treatment, and injection system components. Inspection checklists are provided in Appendix D of the O&M Manual.

Included in Attachment D are copies of a few typical inspection forms and typical site operations parameters monitored on a daily basis when the operator visits the site. The inspections note conditions for the recovery and injection wells and the treatment system.

Groundwater recovery and injection wells

Pumping and injection flow rates are monitored and recorded
The service road and recovery and injection well piping system are inspected
Groundwater levels are evaluated based on semi-annual collection of groundwater elevations.

Groundwater Treatment System

Filter bags are examined each time the operator visits the treatment system;
Air stripper blowers are inspected for signs of excess noise and vibration;
Leaks, or other signs of deterioration are noted and repaired;
Treatment system piping and system pressures are checked and recorded;
Pumps in the treatment buildings are be inspected with every operator visit;
Pumps are be checked for discharge pressure, signs of excess noise, vibration, seal or gasket leaks, lubrication leaks or other signs of deterioration

General Cleaning, Housekeeping, and Storage

Housekeeping duties outlined in the O&M Manual required general yard work, road maintenance work, field maintenance, general cleaning, and janitorial duties. It also requires that housekeeping equipment and supplies should be stored in safe and permanent storage areas.

Troubleshooting

The O&M Plan provides the equipment manufacturer's literature for troubleshooting, and review. If a piece of equipment continues to malfunction and causes the remediation system to become unreliable, manufacturer's representative are available and can be contacted for a service call or to obtain a replacement.

Annual O&M Costs

The projected annual O&M cost for air-stripping remediation of groundwater was \$306,875 in the 1990 Feasibility Study (FS).

Actual annual O & M costs for the operation and maintenance of the groundwater pump and treat system at the Bluff Road Site are below the FS projection and typically average about \$220,000 a year.

Progress Since Commissioning

The groundwater remedial system construction is complete and startup was in August 1996. The system for extraction, treatment and injection of groundwater is anticipated to operate for 16 years.

As of August 2008, based on the SCRDI-Bluff Road Monthly Progress Report, and as verified by this Five-Year Review, the operation of the groundwater treatment system has continued within permit levels for air emissions and treated water quality for groundwater injection.

Analytical results indicate the groundwater system is functioning satisfactorily. As of August 31, 2008, approximately 678 million gallons of groundwater have been recovered, treated and re-injected since system startup. Approximately 3851 pounds of VOCs have been effectively removed and treated within discharge limits.

The operation of groundwater recovery and treatment system has resulted in the improvement of groundwater quality at the site.

Approximately 91% of the mass in the 1996 VOC plume has been extracted by the groundwater recovery system (GWRS) based on groundwater quality data from the annual groundwater sampling event in October 2007.

A summary of monitoring well analytical data obtained through October 2007 is presented in Attachment E of this document.

Discussion of these data is also presented in Section VI.

V. PROGRESS SINCE THE LAST 5-YEAR REVIEW

Protectiveness Statement from the first Five-Year Review report in 2003

The first Five-Year review report was prepared by the United States Army Corps of Engineers and approved by EPA on April 29, 2003.

The following statement is the protectiveness statement from the first Five Year Review.

“Based on this Five-Year Review and the above summary, all of the elements of the remedy selected by the ROD for the SCRDI Bluff Road Site have been put in place, are functioning properly, are operated and maintained adequately, and remain protective of human health and the environment.”

The site soils remedy has been previously completed as noted in this review report. There has been no new information that has come into light that would call into question the protectiveness of the completed soils remedy.

Since the first Five-Year Review in 2003, the groundwater pump and treatment system has continued to operate satisfactorily. There has been no new information that has come into light that would call into question the protectiveness of the groundwater remedy.

In March 2002, the time of the first Five-Year review report data evaluation, approximately 305 million gallons had been recovered, treated and re-injected from system start-up in September 1996 removing 2,900 pounds of VOCs. As of August 2008, the total gallons of contaminated groundwater that has been recovered, treated, and re-injected is now 678 million gallons, removing approximately 3,851 pounds of VOCs.

Issues or Deficiencies from the first Five-Year Review report in 2003

The first Five Year review report noted as an issue or deficiency that the groundwater treatment system was designed to operate at 240 gpm noting that the system operated at a lower pumping rate. The statement is misleading as the extreme upper limit was 240 gpm for various mechanical fixtures.

The groundwater remedy was a groundwater recovery system to be operated at 160 gpm, which later was evaluated upon deactivation of recovery well RW-3 and determined adequate operating at 140 gpm.

The annual reviews of the groundwater remedy indicates that groundwater contamination levels have continued to decrease since the first Five Year Review in 2003. It is calculated that the overall groundwater contamination has decreased 91% since initial start-up in 1996 of the groundwater remedy. As of August 2008, the total is now 678 million gallons, removing approximately 3,851 pounds of VOCs.

The annual review of the groundwater recovery system for 2007 indicated that the contaminated groundwater plume was contained and continues to be contained.

The first Five Year Review in 2003 also noted an issue or deficiency with respect to the status of documents submitted to the local repository. It was noted that the latest documentation on file were the SVE system design documents.

Since this review in 2003, additional and necessary documents have been placed in the repository.

The documents now include the:

SVE Remedial System Soil Closeout Report, August 1996, which documents the final report regarding completion of soils remediation.

Groundwater Remedy Remedial Action Report, November 1996, which documents the completion of construction and initial testing and operation of the pump and treat system.

Preliminary Closeout Report (PCOR) issued by EPA, September 1998. This report provides a good review regarding completion of SVE operations for site soils remediation and marks the construction completion of the groundwater remedy.

First Five-Year Review Report, approved by EPA and dated April 2003. This provides a very good history, and an overview of the past and present site remediation work.

The annual report, 'Review of Groundwater Recovery System Performance' dated May 24, 2007. This provides a current review of groundwater recovery, trends in the level of groundwater contamination, and a site history and summary of groundwater contamination levels since the start of groundwater pump and treat system.

The local repository is the Richland County Public Library, Southeast Regional Branch, located at 7421 Garners Ferry Road, Columbia, South Carolina 29209.

These additional records provide the necessary information to document the site work completed, the completion of the soils remedy, the current information in regards to groundwater contamination, and the current and up to date information on the continuing groundwater remedy.

VI. FIVE - YEAR REVIEW PROCESS

Administrative Components

From November 2007 through August 2008, the various components of the review included:

- Community involvement;
- Document review;
- Data review;
- Site inspection and local interviews

The Second Five-Year Review Report completion was scheduled for April 2008.

Community Involvement

Activities to involve the community in the 2nd Five-Year Review process for the Bluff Road Site were initiated with a notice that was sent to the Columbia newspaper, 'The State.' This notice stated that a 2nd Five-Year Review was to be conducted and completed by April 29, 2008.

This notice was posted in city of Columbia newspaper 'The State' on March 28, 2008. A copy of this notice is provided in Attachment G of this report.

Within thirty (30) calendar days of the 2nd Five Year Review finalization, a notice will be published in 'The State' newspaper announcing that the 2nd Five Year Review Report for the Bluff Road Site is complete, and the results of the review and the report are available to the public at the information repository at the above location. This report will also be placed in the Administrative File in the EPA Record Center, 11th Floor, 61 Forsyth Street, Atlanta, Georgia and DHEC. This report will also be placed on the U.S. EPA website (<http://www.epa.gov/superfund/index.htm>).

A copy of the second Five-Year Review will also be placed in the designated public repository: Southeast Regional Branch of The Richland County Library located at 7421 Garners Ferry Road, Columbia, SC 20209.

Concurrent with the Five-Year Review Process, EPA conducted interviews with one city official, two state representatives, and four community members between the dates of April 14 -15, 2008. The following questions were asked to each individual:

1. What is your overall impression of the project?
2. Are you familiar with EPA activities at the site over the past years?
3. Do you live near the site?
4. Have you been pleased or displeased with clean-up activities at the site?
5. What effects, if any, have site operations had on the surrounding communities?

6. Do you still have any concerns regarding EPA clean-up activities at the site?
7. Do you think you have been kept adequately informed about clean-up activities at the site?
8. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities?
9. Is there someone else that you would like to recommend that we contact for more information?

There is not an organized group of local citizens involved with this Site. Since the initial clean-up, community interest in the Bluff Road Site is very minimal.

Summarizing the results from the community interviews, there seems to be a general consensus that EPA's efforts concerning the initial clean-up were greatly welcomed and appreciated. There is still some concern from a citizen that the cancers found in the area may be the result of long term effects from the site.

According to the City Official, there have been no complaints from the community concerning this site. As stated in the first Five-Year Review, EPA was able to assure that these properties had not been adversely affected by activities that occurred at the site.

Document Review

This Five-Year Review consisted of a review of relevant documents, including the O&M records, monitoring data, and operating permits at the SCRDI-Bluff road site.

The documents reviewed are listed in Attachment B.

Examples of the site O&M records reviewed are included in Attachment D.

Data review

The data review consisted of a review of the previous data and the most recent data to establish the basis for the work and the progress to date.

As the remedial action and clean-up of the site soils has been completed, the data for the site soils did not need to be reviewed. The 2003 Five-Year Review stated in section IX that further Five-Year Reviews were not necessary for the soil remedial action.

The previous and current data for the groundwater remedy was reviewed.

The performance of the system was previously evaluated after system startup in the June and November 1996 based on the evaluation of the groundwater potentiometric surface, change in gradient, and flow directions. The evaluation of capture at startup concluded that groundwater recovery was effective in containing the VOC plume. It was also concluded that the system was containing the plume at a pumping rate of 130 to 140 gpm; recovery effectiveness was due to adequate pumping from RW-6, RW-7, and RW-8; and reduction in pumping in RW-1 through RW-5 was noted.

According to the Remedial Action Report several modifications to the system were implemented to address field conditions. One of the modifications included the shut down of RW-3 due to excessive iron levels, at concentrations as much as 40,000 ug/L. Afterwards, ERM conducted a Capture Zone Evaluation Report in 25 November 1997. The purpose of the report was to present an evaluation of the groundwater recovery system performance with respect to the capture of the defined Site VOC plume. This report concluded that VOC capture was still taking place at a sufficient rate. Groundwater quality data were also evaluated in this report. It was concluded in this evaluation that VOC levels were demonstrating a decreasing trend in concentrations in wells MW-2A, MW-13B, MW-17B, MW-18B, and MW-21B; and that wells MW-16B, MW-22B, and RW-6 were demonstrating an increase in VOC concentrations. In addition, it was noted that VOCs in wells MW-19B and MW-20B were below quantitation limits and VOC concentrations in MW-17B, MW-18B, and MW-21B were below cleanup criteria.

The purpose of the Southwest Area Investigations Report submitted in January 1998 was to verify the extent of plume capture near and in the vicinity of RW-8, and assess VOC impacts on the southwest side of Bluff Road. The following are some of the conclusions that were made:

- The VOC plume is present on the southwest side of Bluff Road at TP-4;
- The southern extent of the VOC plume is less than 100 feet south of RW-8. The groundwater at temporary piezometers TP-01 and TP-02 in the area of RW-8 meets Site cleanup criteria for VOCs;

- Pumping at RW-6 and RW-7 contains the plume, thereby cutting off the source of contaminants to the southwest side of the road and ultimately Mill Creek;
- Based on mass balance calculations, it was demonstrated that without the current implementation of the groundwater treatment system, hypothetical discharge of the VOC plume to Mill Creek would not adversely impact the surface water quality (i.e., VOC concentrations would not exceed Federal and State drinking water standards);
- No groundwater receptors have been identified for the portion of the VOC plume that has already migrated beyond Bluff Road; and
- Restoration of groundwater quality southwest of Bluff Road should occur in the same time frame as the groundwater plume on the northeast side of Bluff Road.

Currently, as of the August 2008 site Monthly Progress Reports, and as verified in this Five-Year Review, the operation of the groundwater treatment system has continued within permit levels for air emissions and treated water quality for groundwater injection. Analytical results indicate the groundwater system is functioning satisfactorily.

As of the end of August 2008, approximately 678 million gallons of groundwater have been recovered, treated and re-injected since system startup. Approximately 3851 pounds of VOCs have been effectively removed and treated within discharge limits.

According to the Review of Ground Water Recovery System Performance of the SCRDI Bluff Road Site, submitted in June 2007, the following conclusions and recommendations were made:

- The operation of GWRS has resulted in the improvement of groundwater quality at the site. Approximately 88% of the mass in the 1996 VOC plume has been extracted by the groundwater recovery and treatment system based on the analysis of the groundwater sampling event of October 2006.
- The capture zone for the GWRS is similar to those presented in previous evaluations and encompasses all wells that currently exceed the Cleanup Criteria.
- Complete capture is provided by the southern recovery wells: RW-06, RW-07, and RW-08 located along Bluff Road. Remedial pumping is being performed in the center and northern portions of the plume by the northern recovery wells RW-01, RW-02, RW-04, and RW-05. The northern pumping is intended to expedite mass removal. However, due to remedial progress, the northern wells are currently recovering about 34% of the VOC mass, while the southern wells are recovering approximately 66% of the VOC mass.

- The well pair groundwater levels evaluations support the potentiometric surface evaluation and provide a high degree of confidence that the VOC plume northeast of Bluff Road is contained by the existing GWRS.
- Temporary piezometers TP-03 and TP-04 continue to provide valuable information concerning the VOC plume and performance of the remediation system. It was recommended that TP-01 and TP-02 be abandoned.

A review of records and monitoring reports through August 2008 (Attachment B) indicates that total VOC concentrations have decreased across the site. The most recent summary of the analytical data for the groundwater, collected from a select number of monitoring wells, is included in Attachment E.

The operation of the groundwater treatment system has continued within permit levels for air emissions and treated water quality for groundwater injection.

Analytical results indicate the groundwater system and treatment system are functioning satisfactorily.

As previously mentioned, the site O&M records were reviewed. Examples of more current site O&M records are listed in Attachment D.

The current SCDHEC air and groundwater injection permits were reviewed. The permits were filed at the site and available for review. In addition, the monthly progress reports were reviewed at the site and as documented by the Monthly Progress reports, the air and groundwater injection permits were being met.

Site Inspection and site visits

Site visits for the Five-Year Review were made by the following personnel.

Name	Company	Job Title	Telephone No
Steve Sandler	EPA	Remedial Project Manager	(404) 562-8818
Linda Starks	EPA	Public Affairs Specialist	(404) 562-8487
John Stiles	de maximis, inc.	Project Manager	(865) 691-5052

Steve Sandler conducted a Site inspection on April 15 to review groundwater system operations and with Linda Starks, conducted community interviews on April 15 and 16. John Stiles made site visits on March 5, April 3, and April 15 in regards to the groundwater treatment system operations.

The site inspection evaluated site access and control, on-site documentation of Operations and Maintenance and Health and Safety, and the groundwater treatment system. Photographs from the site inspection are included in Attachment C.

During the site inspection, the treatment system operator was interviewed and the manager for the O&M operations was also contacted. The representatives from O&M, Inc. were :

Scott Ingles	O & M, Inc.	Operator - groundwater treatment system
Dan Garrigan	O & M, Inc.	Manager - groundwater treatment system operations

Mr. Ingles is the SCDHEC licensed site operator (level D), an O&M, Inc. employee, and is responsible for day to day operations and maintenance. He is knowledgeable of the groundwater treatment system functions, operations and maintenance schedules. He is also certified in accordance with CFR 1910.120 for hazardous waste personnel. Operators are on call 24 hours per day, 7 days a week to respond to any emergencies.

Mr. Garrigan is the site operations manager for O&M, Inc. and is very familiar with site operations and visits the site at least twice annually for the groundwater sampling events.

The permits and O&M manuals require the operator to maintain a file of operational activities each month, including a description of work completed in the previous reporting period and anticipated work in the upcoming period, corrective actions taken and modification of system operation and schedule. These records were on-site and maintained in good order. Copies of the site permits were at the site. Copies of the monthly progress reports provided to the EPA, since commencement of groundwater system operations in 1996, were in the site records.

The weekly inspection checklists for the month of March were reviewed. The checklist is actually completed for each day the operator visits the site. The checklist includes many flow and operational parameters. The checklists were filled out satisfactorily. Examples of the inspection list are provided in Attachment D.

Records of maintenance of groundwater recovery, treatment and injection systems were on-site and in place.

All site visitors were required to sign the Site log-in sheet.

A detailed tour of groundwater remediation system was given by Scott Ingles.

- The functionality of the recovery well pumps and service yard piping conveying contaminated groundwater to the treatment building.
- The functionality of the influent groundwater manifold header pipe, the equalization tank, and transfer pump P1.

- The functionality of the air strippers units and blower units (operated in parallel), and the positive displacement transfer pump P2.
- The functionality of the granular activated carbon (GAC) vessels, operated in series, and the effluent treated groundwater manifold piping.
- The functionality of the recovery well pump controls and pump controls for the transfer pump P2.
- The functionality of the treated groundwater re-injection piping and re-injection wells.
- Sample collection stations for contaminant concentration monitoring for the contaminated influent groundwater and the treated effluent groundwater.
- Discussion on the 24-hour, 7-days a week, staff availability at the site.

Good site management practices are being fully implemented.

It was also verified that the monitoring wells, recovery wells, and injection well casing are kept secure by locks at the well casings. The operator Scott Ingles reported that site vandalism of the treatment building and wells has never occurred.

Photographs from the site inspection are included in Attachment C.

The photographs show the current condition of the groundwater treatment system, and the general layout of the treatment system components in the building. The photographs also show a typical recovery well, injection wells and the general condition of the gravel service roads that are a part of the overall remedial system installation.

The main components of the treatment system includes two air strippers and two GAC carbon vessels to remove the site VOC contamination before the recovered and treated groundwater is re-injected back into the shallow groundwater aquifer.

A summary of the groundwater data for the VOC contamination levels at the various monitoring well and recovery well sampling locations is provided in Attachment E the locations of the wells are illustrated in the figures in Attachment A

The Five Year review site inspection checklist is included in Attachment F

VII. TECHNICAL ASSESSMENT

The following conclusions support the determination that the remedy implemented at the SCRDI-Bluff Road Site is protective of human health and the environment.

Question A: Is the remedy functioning as intended by the decision documents?

Yes, the remedy is functioning as intended by the site ROD. The review of documents, ARARs, risk assumptions, the ongoing groundwater recovery and treatment system and the results of the site inspection indicates that the remedy is functioning as intended by the ROD.

Remedial Action performance

Completed soils remedial action

Construction of the soil remedy was started and completed in 1994. The soil cleanup goals were achieved in late 1996. USEPA approved the soil remedy as complete in March 1997 and the system was removed from the site by early April 1997. The approval of the completion of soil remedy was made by the EPA in March 1997. The preliminary Close Out Report issued by the EPA on September 9, 1998 indicates the same and documents the operational status of the groundwater remedy at that time.

Operating groundwater remedial action

The groundwater remedial system construction was completed in August 1996. Operation of the groundwater recovery and treatment system is ongoing.

The groundwater remedial action continues to operate and function as designed. As of August 2008, based on the SCRDI-Bluff Road Monthly Progress Report, and as verified in this Five-Year Review, the operation of the groundwater treatment system has continued within permit levels for air emissions and treated water quality for groundwater injection. Analytical results indicate the groundwater treatment system is functioning satisfactorily. Groundwater sampling of the monitoring wells indicate groundwater contamination levels are declining.

The level of contamination is decreasing at the monitoring and recovery wells at approximately the same rate. The annual review of the groundwater system performance indicates the plume of contamination is contained.

Annual review of the groundwater recovery system indicates control of the plume is adequate. Operation of the recovery wells, and specifically recovery wells RW-6, RW-7, and RW-8 is adequate to capture and contain the plume.

Previous sampling of distant residential wells along Lower Richland Boulevard in 1994 and residential wells along Bluff Road in April 1996 indicate the contamination never reached these areas.

Additionally, sampling of three locations in Mill Creek in April and August 1998, some distance from the recovery wells, indicates contamination did not reach Mill Creek. Groundwater velocities are high enough that the VOC plume could have reached Mill Creek. Groundwater pumping at RW-6, RW-7, and RW-8 contains the plume, thereby cutting off the source of contaminants to the southwest side of the road and ultimately Mill Creek.

There is low level VOC contamination, above clean up levels, on the southwest side of Bluff Road at piezometer TP-4. Operation of the recovery wells RW-6, 7, and 8 has significantly lowered VOC contamination as documented in the site annual performance reports.

Groundwater treatment system operations / O&M

Maintenance procedures are adequate to maintain the effectiveness of the groundwater remedial action as indicated by the continued decrease in contamination levels in the plume based on groundwater data from the extraction and monitoring wells. Monthly progress reports submitted to EPA and SCDHEC indicate effluent discharge and re-injection are meeting permit requirements.

The maintenance procedures reflect that the low level of iron (less than 5 ppm) in the groundwater recovery requires continual monitoring and cleaning of the recovery well piping, recovery well pumps, air strippers, and the GAC carbon units.

The implemented system has been operated according to O&M Manual specifications, with the exception of recovery well RW-3.

RW-3 was taken offline due to excessive iron content. The total planned startup recovery pumping rates, as outline in the Operations and Maintenance Manual was 160 gallons per minute and subsequently 140 gpm with RW-3 offline. Although the pumping rate is lower than originally expected (130 to 140 gpm); the groundwater sampling analytical data indicates the system is containing the plume; contamination levels are decreasing, and the treated groundwater is re-injected below SCDHEC permit standards and drinking water MCLs.

In addition, the site HASP and the Contingency Plan are in place, and are sufficient to control risks, and are properly implemented.

Cost of system operations / O&M

The site is a PRP lead site. O&M costs were estimated to be approximately \$306,875 in the ROD for air stripping alone. The present groundwater recovery and treatment system includes an air stripper and GAC carbon units.

Present costs for all aspects of the work including EPA oversight, project management, trust account, and O&M averages about \$220,000. There are no large variances from the original cost estimates for the groundwater remedy.

Implementation of Institutional Controls and Other Measures:

The PRPs have an access agreement with the property owners, which prohibits installation of groundwater wells within the area of the groundwater contamination. This agreement expires on December 13, 2014. The instituted agreement is adequate to ensure that exposure pathways do not exist for exposure to contaminated shallow groundwater aquifer. Institutional Controls outside of this agreement have not been implemented.

The groundwater recovery, injection wells, and monitoring wells are locked and provide adequate protection to accidental exposure. The groundwater treatment system building is also locked and alarmed, providing adequate protection.

There is a gate at the front of the site but there is not a fence around the entire property. The locked wells and treatment system building have been adequate in the ten years of operation.

Monitoring activities:

The monitoring activities are adequate and have demonstrated that the protectiveness and effectiveness of the remedy is adequate.

Semi-annual groundwater sampling events are conducted and reported semi-annually to EPA and SCDHEC. The contamination levels continue to decrease indicating the groundwater remedy is adequate.

An annual report is submitted summarizing a review of the hydrological conditions and the annual reports continue to indicate that the plume is under hydrological control.

Opportunity for optimization

There are no readily apparent areas or opportunities to improve the performance or reduce costs in a cost effective manner. There is no need to add or remove any processes in the groundwater treatment.

Remedial alternatives might be investigated in regards to the current groundwater recovery activities. Such alternatives could be, for example, air sparging, biological or chemical enhancement for VOC removal. These efforts would be problematic given the area extent of the plume. If investigated and subsequently implemented, these alternatives might not be expected to replace the present groundwater treatment system.

Early indicators of potential remedy problems:

There are no known problems that could lead to the remedy not being protective.

There are no large variances in system performance or costs that would indicate a continuing problem or potential problem that might reduce the protectiveness of the remedy.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection still valid?

Yes.

Changes in Standards and TBCs

It is noted that the groundwater MCL or generally used risk based standards used to establish the cleanup criteria in the 1990 ROD have changed for the following volatile compounds.

Toluene - The MCL for toluene is now 1000 ppb versus the 2000 ppb in the 1990 ROD. The toluene levels in groundwater at the site are well below the current standard at all monitoring and recovery wells. No changes to the remedy or operating system are required to meet the new MCL for toluene.

Chloroform - The current MCL for total Trihalomethanes is now 80 ppb versus the chloroform cleanup level of 20.9 ppb in the 1990 ROD. The highest chloroform level is approximately 100 ppb and decreasing. No changes to the remedy or operating system are required to meet the new MCL for chloroform.

Methylene Chloride - The MCL for methylene chloride is now 5 ppb versus the 17 ppb in the 1990 ROD. The methylene chloride levels in groundwater at the site are well below the current standard at all monitoring and recovery wells. No changes to the remedy or operating system are required to meet the new MCL for methylene chloride.

1,1,2,2 Tetrachloroethane - The risk based clean up level in the ROD was 0.6 ppb. There was not and still is not a drinking water standard MCL or MCLG for this compound. Review of the EPA National Recommended Water Quality Criteria (2006) and SCDHEC Regulation 61-68 (2004) indicates a risk based human

health consumption for water & organism of 0.17 ppb. The EPA's IRIS shows a concentration of 1 ppb with a quantitative carcinogenic risk level of 1×10^{-6} for oral exposure. A modification of the groundwater cleanup criteria is not necessary at this time. This compound will likely be the last compound to reach groundwater cleanup criteria levels.

It is also noted that groundwater MCL or risk standards did change for the following metals listed in the ROD groundwater cleanup criteria. As noted in the Supplemental Groundwater Sampling Report of 1995 by ERM, only iron and manganese were reliably detected above groundwater cleanup levels based on dissolved metals analysis in 1995. The following changes reflected for metals are summarized only for completeness of the review. The revisions will not affect the groundwater remedy or require changes in the groundwater remedy. Arsenic is the only metal for which the MCL is lower now than in the 1990 ROD.

Arsenic - The clean up criteria level was 50 ppb in the 1990 ROD. Now the MCL for arsenic is 10 ppb. No changes to the remedy or operating system are required to meet the new MCL. As noted in the Supplemental Groundwater Sampling Report of 1995 by ERM, arsenic was not detected in 1995.

Barium - The MCL for barium is now 2000 ppb versus the 1000 ppb in the 1990 ROD. No changes to the remedy or operating system are required to meet the new MCL.

Chromium - The MCL for chromium is now 100 ppb versus the 50 ppb in the 1990 ROD. No changes to the remedy or operating system are required to meet the new MCL.

Lead - The ROD clean up criteria level for lead is 5 ppb. Now the drinking water action level for lead is 15 ppb. No changes to the remedy or operating system are required.

Selenium - The MCL for selenium is now 50 ppb versus the 10 ppb in the 1990 ROD. No changes to the remedy or operating system are required to meet the new MCL.

There have been no changes in the site conditions that could result in increased exposure identified during the five-year review. There are no current or planned changes in land use.

There have not been any new contaminants or sources identified during this Five-Year Review.

There have been no changes in the site conditions that could result in increased exposure

identified during the five-year review. There are no current or planned changes in land use.

There is no indication that hydrological conditions are not adequately characterized.

Changes in Toxicity and Other Containment Characteristics:

Groundwater volatile organic contaminant levels have decreased since the implementation of the groundwater remedy. Soils remediation is complete.

Changes in Risk Assessment Methodologies

Changes in risk assessment methodologies since the time of the ROD do not call into question the protectiveness of the remedy.

Vapor intrusion has been considered. There are not any residences in the area of the VOC plume, and there is no risk or potential for vapor intrusion. There have never been any residences in the area of the VOC plume.

Changes in Exposure Pathways

No changes in the site conditions that affect exposure were identified as part of the Five-Year Review. There are no current or planned changes in land use. New contaminants, sources, or routes of exposure were not identified during this five-year review. There is no indication that hydrologic / hydrogeologic conditions are not adequately characterized.

Question C:

Has any other information come to light that could call into question the protectiveness of the remedy?

No.

Present information and all groundwater sampling data indicate the groundwater remedy is still protective. There has been no other information revealed that would question the protectiveness of the groundwater remedy. Soils remediation is complete.

VIII. ISSUES

No deficiencies were noted during this Five-Year Review.

The one issue is when will the remediation of the contaminated shallow groundwater be complete.

While the larger mass of the contaminated groundwater has been reduced by 91% based on current contamination levels, it remains to be determined when the specified clean-up levels will be reached for this large plume.

IX. RECOMMENDATIONS and FOLLOWUP ACTIONS

The following recommendations are made with respect to the Site remediation.

1. Further five-year review is not necessary for soil remediation as indicated by the first Five-Year Review.
2. The existing agreement with the Site and adjacent property owners should be maintained so that the installation of drinking water wells is prohibited on the Site and adjacent properties. In absence of any such agreement, institutional controls and restrictive covenants should be established for the properties.
3. Based on the groundwater sampling data for the past 10 years, it is recommended that the larger sampling event (now conducted every 12 months at 19 monitoring wells) be conducted every 18 months after the annual sampling event of October 2008. The present semi-annual event (8 monitoring wells) should continue every 6 months.
4. The Site building and remediation features should continue to be secured and inspected for site vandalism. The Site has a full time treatment system operator and daily Site visits are recommended.
5. The groundwater recovery system should be maintained in best operating condition to meet cleanup goals as expeditiously as possible.

X. PROTECTIVENESS STATEMENT

Based on this Five-Year Review, the remedies selected by the ROD for the SCRDI Bluff Road Site have been put in place, are functioning properly, are operated and maintained adequately, and remain protective of human health and the environment.

The site soils have been remediated to required standards specified in the ROD and the soils Remedial Design plans and specifications.

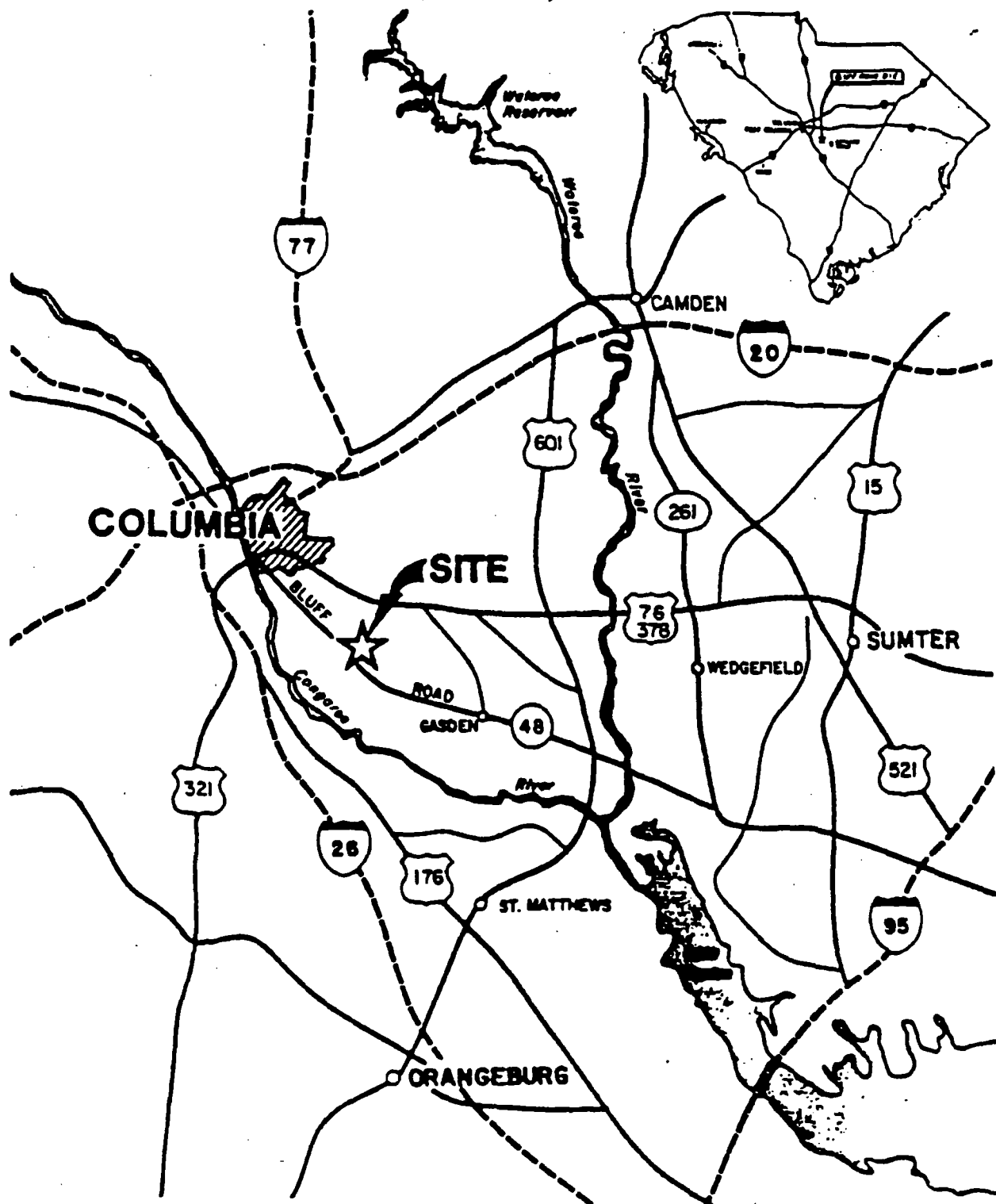
The groundwater remedy continues to be operated and maintained in manner protective of human health and the environment.

XI. NEXT REVIEW

The SCRDI Bluff Road Site is a site that requires on-going five-year reviews as hazardous substance, pollutants, or contaminants remain at the site, in the shallow site groundwater, at levels above that allowed for unlimited use and unrestrictive exposure.

USEPA should conduct the next review by September 2013, and within five years of completion of this Five-Year Review listed as the date of signature on the inside cover of this report.

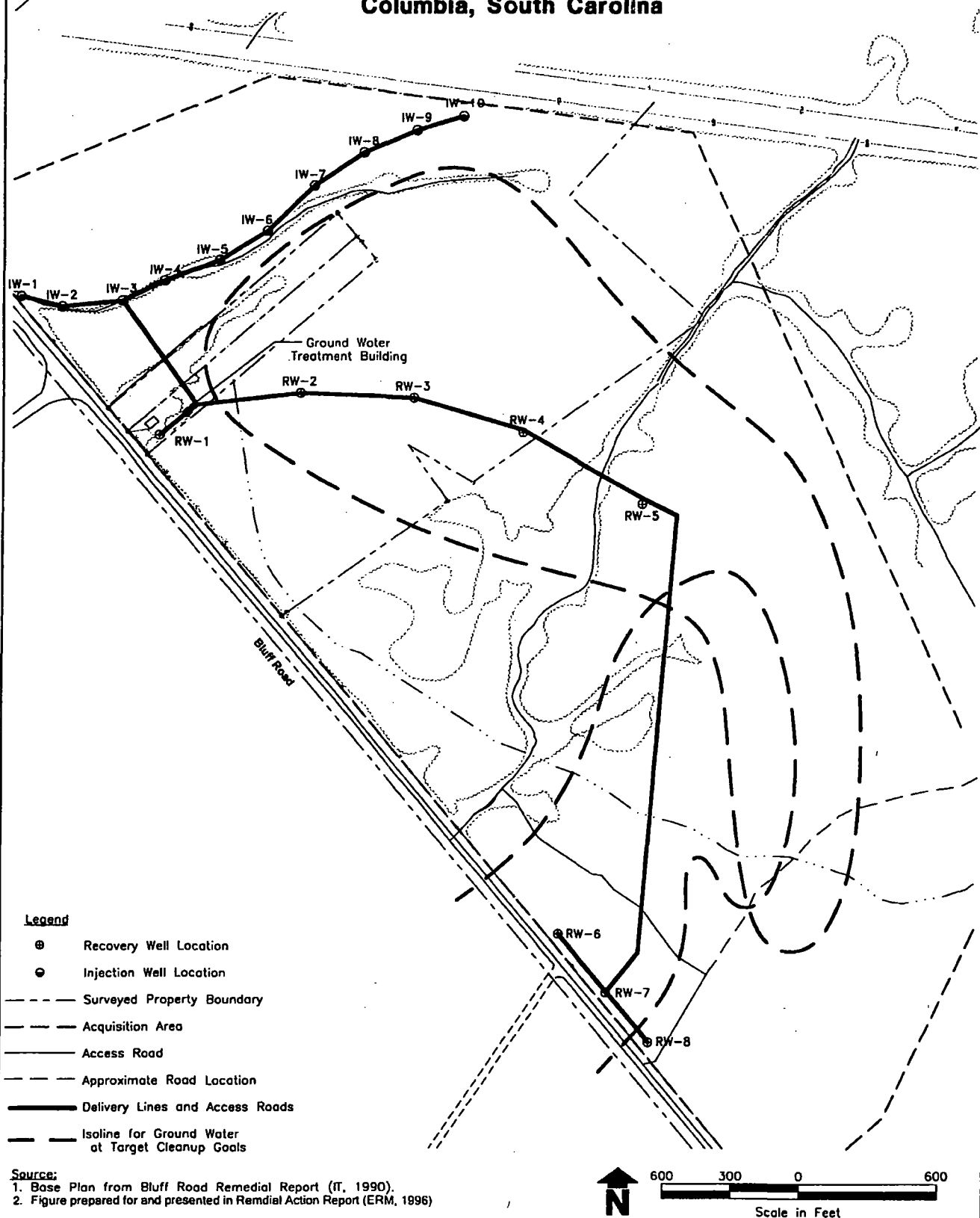
Figure A - 1
Site Regional Setting
SCRDI-Bluff Road Remedial Design Investigation
Columbia, SC



Source: RI Report, 1986, Golder Associates

Source: ERM-Southeast, Inc., Kennesaw, Georgia

Figure A - 3
Ground Water Recovery System
Recovery and Injection Well Locations
SCRDI - Bluff Road Site
Columbia, South Carolina



Source:
 1. Base Plan from Bluff Road Remedial Report (IT, 1990).
 2. Figure prepared for and presented in Remedial Action Report (ERM, 1996)

Figure A - 4
Ground Water Recovery System
Recovery, Injection and Monitoring Well Locations
SCRDI - Bluff Road Site
Columbia, South Carolina



0 500 1,000
 Scale in Feet

Legend

- | | |
|----------|---------------------------------|
| ⊕ RW-3 | Recovery Well |
| ✱ IW-03 | Injection Well |
| ◇ MW-22B | Monitoring Well |
| ◇ TP-03 | Temporary Piezometer |
| — | Delivery Lines and Access Roads |
| — | Acquisition Area |

ATTACHMENT B

Documents Reviewed

Documents Reviewed

Remedial Investigation Bluff Road Site, April 1986, Richland County South Carolina, Volumes I and II of II, Golder Associates. (Brief review at local library repository)

Remedial Investigation Report SCRDI-Bluff Road Site, February 1990, Volume I and II, IT Corporation, Knoxville, TN. (Brief review at local library repository)

Feasibility Study Report SCRDI-Bluff Road Site, Volume I and II- Report, March 1990, Columbia, South Carolina. (Brief review at local library repository)

Feasibility Study Report Public Comments SCRDI-Bluff Road Site, Volume I - Report, June 1990, Submitted by the Bluff Road Group. (Brief review at local library repository)

Record of Decision, Remedial Alternative Selection, SCRDI Bluff Road Site, September 1990, SCRDI Bluff Road Superfund Site. (Brief review at local library repository)

Superfund Program Explanation of Significant Differences, March 1991, SCRDI Bluff Road Superfund Site, Columbia, Richland County, South Carolina, Fact Sheet describing the change in the five-year review provisions applicable to the SCRDI Bluff Road Superfund Site. (Brief review at local library repository)

Superfund Program Explanation of Significant Differences, Fact Sheet, June 1994 (Brief review at local library repository)

Accelerated SVE Remedial System Design, January 1994, SCRDI Bluff Road Site, Volume I and Volume II, Columbia Richland, South Carolina, Prepared by Terra Vac. (Brief review at local library repository)

Public Information Meeting for the SCRDI Bluff Road Site, Richland County, South Carolina, May 16, 1994, Public Meeting Summary, Hopkins Park Community Center. (Brief review at local library repository)

Supplemental Ground Water Sampling Investigation Report, April 1995, Environmental Resources Management, Inc.

Operations and Maintenance Plan Documents, June 1996, Volume I, Construction Submittal, Operations and Maintenance Manual and Support Documents, Ground Water Recovery, Treatment and Injection System, Environmental Resources Management, Inc.

Operations and Maintenance Plan Documents, June 1996, Volume II, Construction Submittal, Operations and Maintenance Manual and Support Documents, Ground Water Recovery, Treatment and Injection System, Environmental Resources Management, Inc.

Documents Reviewed (Continued)

Ground Water Recovery Treatment, and Injection Systems Operations and Maintenance Plan, SCRDI-Bluff Road Site, June 1996, Construction Submittal, Environmental Resources Management, Inc.

Ground Water Recovery Treatment, and Injection Systems Performance Standards Verification Plan, Appendix C, June 1996, Final Submittal, Environmental Resources Management, Inc.

SCRDI Bluff Road Site VVE Remedial System Soil Closeout Report, August 1996, Prepared by Terra Vac.

Baseline Groundwater Sampling Event for the SCRDI-Bluff Road Site, July 1996, Environmental Resources Management, Inc.

Capture Zone Evaluation, SCRDI-Bluff Road Site, November 1997, Environmental Resources Management, Inc.

Southwest Area Investigation Report, SCRDI-Bluff Road Site, January 1998, Environmental Resources Management, Inc.

First Five-Year Review Report, April 2003, US EPA, Region 4.

Storm Water Pollution Plan, October 2005, O&M Inc.

Review of Groundwater Recovery System Performance, Services Environmental, Inc., April 21, 2004.

Review of Groundwater Recovery System Performance, Services Environmental, Inc., March 9, 2005.

Review of Groundwater Recovery System Performance, Services Environmental, Inc., April 6, 2006.

Review of Groundwater Recovery System Performance, Services Environmental, Inc., May 24, 2007.

Summary of Sampling Groundwater and Recovery Wells, SCRDI, Bluff Road, Columbia, South Carolina, January 2008.

Monthly Progress Reports, January 2003 - December 2007.

SCDEHC air and groundwater injection permits (copies available in site records at the treatment building)

Documents Reviewed (Continued)

SC DHEC Regulation 61-58 State Primary Drinking Water Regulation - October 2006

SC DHEC Regulation 61-68 Water Classifications and Standards - June 2004

EPA National Recommended Water Quality Criteria, Office of Water & Office of Science and Technology, 2006

ATTACHMENT C

Site Photographs



Site entrance at front gate at Bluff Road (Hwy 48)

Groundwater treatment system building in the background



Groundwater Treatment building

Recovery wells pump the groundwater back to the treatment building

The treatment building houses equipment to treat the contaminated groundwater

The building is approximately 45 feet by 55 feet by 18 feet high



North side of groundwater treatment building

Gravel service road is heading east to the recovery wells



Monitoring well MW-25B in left foreground

Recovery well RW-7 in right background

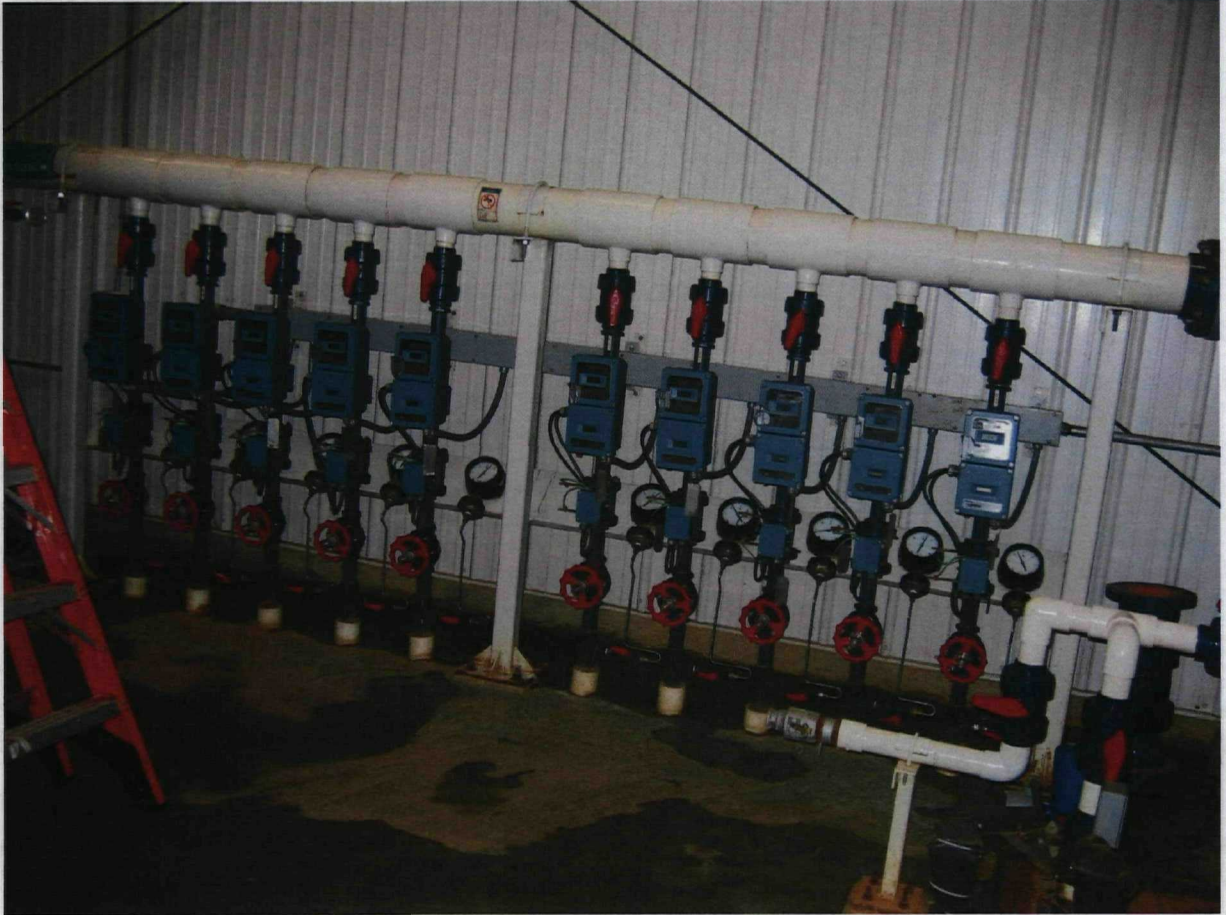
Bluff Road (Hwy 48) is visible to the right

Recovery well and monitoring well casings are locked



Recovery well RW 7

Typical recovery well installation
Electrical boxes on outside of well casing
Protective bollards between service road and recovery well
Recovery well casing is locked



Recovery Well manifold piping

Groundwater from recovery wells is pumped along individual pipes into the common manifold and then into an equalization tank



Equalization tank in the left background
Air stripper in the right background

Groundwater is pumped from the equalization tank through the air strippers
The next step is pumping the groundwater from air stripper sumps through GAC units



Air stripper and blower

Groundwater is pumped into the top of the air strippers. The blower, in left foreground, forces air up and through the groundwater, removing or stripping volatile organic compounds from the groundwater as groundwater flows down into the air strippers sump. Transfer pump moves water from stripper sumps and pumps the groundwater water through the GAC units and into the injection wells



Granular Activated Carbon (GAC) units

Groundwater is pumped through the GAC units removing additional volatile organic compounds not removed by air strippers
Groundwater, treated to drinking water standards, is pumped into the upgradient injection wells



Injection well IW-1 and service road

Injection well is in right background

Bluff Road is in the background

Westinghouse property is across Bluff Road



Injection well IW -2

typical injection well installation, well casing is locked
protective bollards between the service road and injection well

ATTACHMENT D

Site O&M Inspection Forms
(Groundwater remedy O&M)

WEEKLY INSPECTION CHECKLIST
SCRDI-BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

DATE: February 7th, 2006

TIME IN: 0700 TIME OUT: 1545

WEATHER CONDITIONS: Clear and mild

APPROXIMATE TEMPERATURE: 55°F

NAME/OPERATOR: James S. Taylor

SIGNATURE: [Signature]

CERTIFICATION #: #05525

Well Recovery Information

ITEM	PUMP OPERATIONAL (Yes/No)	NORMAL CONDITION	FLOW RATE (gpm)	TOTAL FLOW (gpm)
RW-1 (FQI-1)	<u>Yes</u>	15 to 25 gpm	<u>8</u>	<u>39041633</u>
RW-2 (FQI-2)	<u>Yes</u>	20 to 25 gpm	<u>20</u>	<u>80839994</u>
RW-3 (FQI-3)	<u>No</u>	20 to 25 gpm	<u>0</u>	<u>178640</u>
RW-4 (FQI-4)	<u>Yes</u>	10 to 20 gpm	<u>16</u>	<u>85673480</u>
RW-5 (FQI-5)	<u>Yes</u>	20 to 25 gpm	<u>17</u>	<u>2779174</u>
RW-6 (FQI-6)	<u>Yes</u>	40 to 50 gpm	<u>34</u>	<u>66223800</u>
RW-7 (FQI-7)	<u>Yes</u>	5 to 10 gpm	<u>6</u>	<u>31820099</u>
RW-8 (FQI-8)	<u>Yes</u>	5 to 10 gpm	<u>14</u>	<u>74791133</u>

Well Injection Information

ITEM	NORMAL CONDITION	FLOW RATE (gpm)	TOTAL FLOW (gpm)	PRESSURE READING PSI
IW-1 (FQI-23)	0 to 3 gpm	<u>13</u>	<u>43230232</u>	<u>11</u>
IW-2 (FQI-25)	0 to 8 gpm	<u>12</u>	<u>61833681</u>	<u>6</u>
IW-3 (FQI-27)	0 to 8 gpm	<u>21</u>	<u>64351585</u>	<u>10</u>
IW-4 (FQI-29)	0 to 8 gpm	<u>15</u>	<u>54813478</u>	<u>10</u>
IW-5 (FQI-31)	15 to 20 gpm	<u>15</u>	<u>63450874</u>	<u>11</u>
IW-6 (FQI-33)	25 to 35 gpm	<u>16</u>	<u>69096250</u>	<u>17</u>
IW-7 (FQI-35)	15 to 25 gpm	<u>14</u>	<u>69262144</u>	<u>10</u>
IW-8 (FQI-37)	20 to 30 gpm	<u>13</u>	<u>62875779</u>	<u>11</u>
IW-9 (FQI-39)	30 to 45 gpm	<u>15</u>	<u>64046787</u>	<u>12</u>
IW-10 (FQI-41)	10 to 32 gpm	<u>14</u>	<u>51254698</u>	<u>10</u>

TREATMENT SYSTEM
WEEKLY INSPECTION CHECKLIST
(Continued)

Well Recovery Information

TAG NO.	DESCRIPTION	DEVICE	UNITS	NORMAL VALUE	OBSERVED CONDITION	COMMENTS
F-1	Pressure across Duplex Filter No. 1	dPSH-19	psi	<20 psi	9 psi	
TK-1	Influent Equalization Tank Level	LIT-9	inches	21.5-65.4	33.14 in	
P-1	Stripper Feed Pump Discharge Pressure	PI-11	psi	15 psi	12.5 psi	
	Flow to Air Strippers	FIT-45 Total	gpm gallons	80 gpm	70	96332623
		FIT-46 Total	gpm gallons		70	3085129
B-1	Blower No. 1 Discharge Pressure	Pressure Gauge	Inches wc	15 to 25	24	
3-	Blower No. 2 Discharge Pressure	Pressure Gauge	Inches wc	15 to 25	25	
S-1	Air Stripper No. 1	Trouble Alarm	off		off	
S-2	Air Stripper No. 2	Trouble Alarm	off		off	
-2	Transfer Pump Discharge Pressure	PI-17 ABB Drive ABB Drive Motor Temp	PSI Hertz ops time P-2 (on motor)	35 to 58 psi 30 Hrs/Min 90-160°F	36.62 hrz 9392 h/s 80°F 90°F	
-2	Pressure across Duplex Filter No. 2	dPSH-49	psi	<20 psi	10 psi	
C-1	Carbon Unit No. 1	Pressure Gauge	psi		35 psi	
C-2	Carbon Unit No. 2	Pressure Gauge	psi		34 psi	
CTI	Header	Pressure PSI	psi		17 psi	
-1	Sump	Level	by sight	1/2 full 1/4 full 1/4 full	1/4 full	

TREATMENT SYSTEM - WEEKLY INSPECTION CHECKLIST (Continued)

Operating Equipment Items:

Tag No.	Description	MAINTENANCE REQUIREMENT	COMPLETED (Yes/No)
P-1	Stripper Feed Pump	Check level of lubricant (change every 1,000 hrs)	Yes
P-3	Sump Pump (Hand Switch)	Confirm operation	Yes

Filter Bag Changes:

FILTER	BAG CHANGED (Yes/No)	New filter size	APPEARANCE OF OLD FILTER
F-1	No		
F-2	No		

COLLECTION SYSTEM - WEEKLY INSPECTION CHECKLIST

ITEM	NORMAL CONDITION	INSPECTED CONDITION	COMMENTS
Injection Wells:			
IW-1	Locked, no leaks, mounding or signs of vandalism	OK	
IW-2	"	OK	
IW-3	"	OK	
IW-4	"	OK	
IW-5	"	OK	
IW-6	"	OK	
IW-7	"	OK	
IW-8	"	OK	
IW-9	"	OK	
IW-10	"	OK	

ITEM	NORMAL CONDITION	INSPECTED CONDITION	COMMENTS
	No abnormal surface water, ponding or soft areas over pipelines	(Normal or Needs Repair)	Repair Requires (2)
	"	RW-1 Normal	
	"	RW-2 Normal	
	"	RW-3 Off	
	"	RW-4 Normal	
	"	RW-5 Normal	
	"	RW-6 Normal	
	"	RW-7 Normal	
	"	RW-8 Normal	

WEEKLY INSPECTION CHECKLIST
SCRDI-BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

DATE: May 23rd, 2006

TIME IN: 0800 TIME OUT: 1430

WEATHER CONDITIONS: Clear to partly cloudy skies

APPROXIMATE TEMPERATURE: 78°F

NAME/OPERATOR: James S. Taylor

SIGNATURE: [Signature]

CERTIFICATION #: #05525

Well Recovery Information

ITEM	PUMP OPERATIONAL (Yes/No)	NORMAL CONDITION	FLOW RATE (gpm)	TOTAL FLOW (gpm)
RW-1 (FQI-1)	<u>Yes</u>	15 to 25 gpm	<u>9</u>	<u>34784157</u>
RW-2 (FQI-2)	<u>Yes</u>	20 to 25 gpm	<u>36</u>	<u>75702534</u>
RW-3 (FQI-3)	<u>N</u>	20 to 25 gpm	<u>0</u>	<u>178640</u>
RW-4 (FQI-4)	<u>Yes</u>	10 to 20 gpm	<u>20</u>	<u>79982635</u>
RW-5 (FQI-5)	<u>Yes</u>	20 to 25 gpm	<u>23</u>	<u>95552186</u>
RW-6 (FQI-6)	<u>Yes</u>	40 to 50 gpm	<u>34</u>	<u>54938167</u>
RW-7 (FQI-7)	<u>Yes</u>	5 to 10 gpm	<u>8</u>	<u>29430953</u>
RW-8 (FQI-8)	<u>Yes</u>	5 to 10 gpm	<u>17</u>	<u>69104046</u>

Well Injection Information

ITEM	NORMAL CONDITION	FLOW RATE (gpm)	TOTAL FLOW (gpm)	PRESSURE READING PSI
IW-1 (FQI-23)	0 to 3 gpm	<u>13</u>	<u>39492282</u>	<u>12</u>
IW-2 (FQI-25)	0 to 8 gpm	<u>18</u>	<u>57452262</u>	<u>14</u>
IW-3 (FQI-27)	0 to 8 gpm	<u>20</u>	<u>58118767</u>	<u>5</u>
IW-4 (FQI-29)	0 to 8 gpm	<u>15</u>	<u>50335874</u>	<u>14</u>
IW-5 (FQI-31)	15 to 20 gpm	<u>15</u>	<u>59043791</u>	<u>15</u>
IW-6 (FQI-33)	25 to 35 gpm	<u>16</u>	<u>64139593</u>	<u>15</u>
IW-7 (FQI-35)	15 to 25 gpm	<u>14</u>	<u>65084320</u>	<u>15</u>
IW-8 (FQI-37)	20 to 30 gpm	<u>13</u>	<u>58894877</u>	<u>10</u>
IW-9 (FQI-39)	30 to 45 gpm	<u>15</u>	<u>59528977</u>	<u>15</u>
IW-10 (FQI-41)	10 to 32 gpm	<u>14</u>	<u>46949583</u>	<u>9</u>

TREATMENT SYSTEM
WEEKLY INSPECTION CHECKLIST
(Continued)

Well Recovery Information

TAG NO.	DESCRIPTION	DEVICE	UNITS	NORMAL VALUE	OBSERVED CONDITION	COMMENTS
F-1	Pressure across Duplex Filter No. 1	dPSH-19	psi	<20 psi	10psi	
TK-1	Influent Equalization Tank Level	LIT-9	inches	21.5-65.4	43.62 inch	
P-1	Stripper Feed Pump Discharge Pressure	PI-11	psi	15 psi	12.5 psi	
	Flow to Air Strippers	FTT-45 Total	gpm	80 gpm	70	74684355
		FTT-46 Total	gpm gallons		70	82326754
B-1	Blower No. 1 Discharge Pressure	Pressure Gauge	Inches wc	15 to 25	30	
B-2	Blower No. 2 Discharge Pressure	Pressure Gauge	Inches wc	15 to 25	30	
S-1	Air Stripper No. 1	Trouble Alarm	off		off	
S-2	Air Stripper No. 2	Trouble Alarm	off		off	
P-2	Transfer Pump Discharge Pressure	PI-17 ABB Drive ABB Drive Motor Temp	PSI Hertz ops time P-2 (on motor)	35 to 58 psi 30 Hrs/Min 90-160°F	35.65 4096 80°F 90°F	
P-2	Pressure across Duplex Filter No. 2	dPSH-49	psi	<20 psi	10psi	
C-1	Carbon Unit No. 1	Pressure Gauge	psi		25psi	
C-2	Carbon Unit No. 2	Pressure Gauge	psi		12psi	
HTI	Header	Pressure PSI	psi		12psi	
L	Sump	Level	by sight	1/2 full 1/2 full 3/4 full	1/4 full	

TREATMENT SYSTEM - WEEKLY INSPECTION CHECKLIST (Continued)

Operating Equipment Items:

Tag No.	Description	MAINTENANCE REQUIREMENT	COMPLETED (Yes/No)
P-1	Stripper Feed Pump	Check level of lubricant (change every 1,000 hrs)	Yes
P-3	Sump Pump (Hand Switch)	Confirm operation	Yes

Filter Bag Changes:

FILTER	BAG CHANGED (Yes/No)	Filter size	APPEARANCE OF OLD FILTER
F-1	Yes	Same size	Very Dirty (Fe)
F-2	Yes	Same size	Very Dirty (Fe)

COLLECTION SYSTEM - WEEKLY INSPECTION CHECKLIST

ITEM	NORMAL CONDITION	INSPECTED CONDITION	COMMENTS
Injection Wells:			
IW-1	Locked, no leaks, mounding or signs of vandalism	OK	lock oiled
IW-2	"	OK	lock oiled
IW-3	"	OK	lock oiled
IW-4	"	OK	lock oiled
IW-5	"	OK	lock oiled
IW-6	"	OK	lock oiled
IW-7	"	OK	lock oiled
IW-8	"	OK	lock oiled
IW-9	"	OK	lock oiled
IW-10	"	OK	lock oiled

ITEM	NORMAL CONDITION	INSPECTED CONDITION	COMMENTS
	No abnormal surface water, ponding or soft areas over pipelines	(Normal or Needs Repair)	Repair Requires (2)
	"	RW-1 Normal	lock oiled
	"	RW-2 Normal	lock oiled
	"	RW-3 Normal	lock oiled
	"	RW-4 Normal	lock oiled
	"	RW-5 Normal	lock oiled
	"	RW-6 Normal	lock oiled
	"	RW-7 Normal	lock oiled
	"	RW-8 Normal	lock oiled

WEEKLY INSPECTION CHECKLIST
 SCRDI-BLUFF ROAD SITE
 COLUMBIA, SOUTH CAROLINA

DATE: June 30th, 2007

TIME IN: 1000 TIME OUT: 1430

WEATHER CONDITIONS: Very hot and humid

APPROXIMATE TEMPERATURE: 98°F

NAME/OPERATOR: James S. Ingles

SIGNATURE: [Signature]

CERTIFICATION #: #05525

Well Recovery Information

ITEM	PUMP OPERATIONAL (Yes/No)	NORMAL CONDITION	FLOW RATE (gpm)	TOTAL FLOW (gpm)
RW-1 (FQI-1)	<u>Yes</u>	15 to 25 gpm	<u>14</u>	<u>39456881</u>
RW-2 (FQI-2)	<u>Yes</u>	20 to 25 gpm	<u>18</u>	<u>83678800</u>
RW-3 (FQI-3)	<u>N</u>	20 to 25 gpm	<u>0</u>	<u>178640</u>
RW-4 (FQI-4)	<u>Yes</u>	10 to 20 gpm	<u>18</u>	<u>87858055</u>
RW-5 (FQI-5)	<u>Yes</u>	20 to 25 gpm	<u>24</u>	<u>5568676</u>
RW-6 (FQI-6)	<u>Yes</u>	40 to 50 gpm	<u>34</u>	<u>71450007</u>
RW-7 (FQI-7)	<u>Yes</u>	5 to 10 gpm	<u>10</u>	<u>32860055</u>
RW-8 (FQI-8)	<u>Yes</u>	5 to 10 gpm	<u>18</u>	<u>1896217</u>

Well Injection Information

ITEM	NORMAL CONDITION	FLOW RATE (gpm)	TOTAL FLOW (gpm)	PRESSURE READING PSI
IW-1 (FQI-23)	0 to 3 gpm	<u>12</u>	<u>45054459</u>	<u>18</u>
IW-2 (FQI-25)	0 to 8 gpm	<u>17</u>	<u>62917952</u>	<u>5</u>
IW-3 (FQI-27)	0 to 8 gpm	<u>20</u>	<u>66644262</u>	<u>19</u>
IW-4 (FQI-29)	0 to 8 gpm	<u>15</u>	<u>56894355</u>	<u>15</u>
IW-5 (FQI-31)	15 to 20 gpm	<u>14</u>	<u>65460729</u>	<u>16</u>
IW-6 (FQI-33)	25 to 35 gpm	<u>16</u>	<u>71326454</u>	<u>16</u>
IW-7 (FQI-35)	15 to 25 gpm	<u>14</u>	<u>71158862</u>	<u>11</u>
IW-8 (FQI-37)	20 to 30 gpm	<u>13</u>	<u>64704480</u>	<u>4</u>
IW-9 (FQI-39)	30 to 45 gpm	<u>14</u>	<u>66154803</u>	<u>16</u>
IW-10 (FQI-41)	10 to 32 gpm	<u>14</u>	<u>52869406</u>	<u>12</u>

TREATMENT SYSTEM
WEEKLY INSPECTION CHECKLIST
(Continued)

Well Recovery Information

TAG NO.	DESCRIPTION	DEVICE	UNITS	NORMAL VALUE	OBSERVED CONDITION	COMMENTS
F-1	Pressure across Duplex Filter No. 1	dPSH-19	psi	<20 psi	6	filter changed
TK-1	Influent Equalization Tank Level	LIT-9	inches	21.5-65.4	42.13	
P-1	Stripper Feed Pump Discharge Pressure	PI-11	psi	15 psi	13.5	
	Flow to Air Strippers	FIT-45 Total FIT-46 Total	gpm gallons gpm gallons	80 gpm	0 120	7094495 11825867
B-1	Blower No. 1 Discharge Pressure	Pressure Gauge	Inches wc	15 to 25	25	
B-2	Blower No. 2 Discharge Pressure	Pressure Gauge	Inches wc	15 to 25	25	
S-1	Air Stripper No. 1	Trouble Alarm	off		off	
S-2	Air Stripper No. 2	Trouble Alarm	off		off	
-2	Transfer Pump Discharge Pressure	PI-17 ABB Drive ABB Drive Motor Temp	PSI Hertz ops time P-2 (on motor)	35 to 58 psi 30 Hrs/Min 90-160°F	33.75 77297 100°F 110°F	
2	Pressure across Duplex Filter No. 2	dPSH-49	psi	<20 psi	6	filter changed
2-1	Carbon Unit No. 1	Pressure Gauge	psi		26	
2-2	Carbon Unit No. 2	Pressure Gauge	psi		15	
CTI	Header	Pressure PSI	psi		20	
1	Sump	Level	by sight	1/2 full 1/2 full 1/2 full	3/4 - 1/4	Pumped down Sump and cleared iron residue.

Temp AS-1
Shutdown
while Blower
required.

* System repair and restart. Shutdown due to T-Storms.
System running on Air Stripper #2 only while repairing AS #1

TREATMENT SYSTEM - WEEKLY INSPECTION CHECKLIST (Continued)

Running Equipment Items:

Tag No.	Description	MAINTENANCE REQUIREMENT	COMPLETED (Yes/No)
P-1	Stripper Feed Pump	Check level of lubricant (change every 1,000 hrs)	Yes
P-3	Sump Pump (Hand Switch)	Confirm operation	Yes

Filter Bag Changes:

FILTER	BAG CHANGED (Yes/No)	New Filter Size	APPEARANCE OF OLD FILTER
F-1	Yes	Same Size	Very Dirty (Fe)
F-2	Yes	Same Size	Very Dirty (Fe)

COLLECTION SYSTEM - WEEKLY INSPECTION CHECKLIST

ITEM	NORMAL CONDITION	INSPECTED CONDITION	COMMENTS
Injection Wells:			
IW-1	Locked, no leaks, mounding or signs of vandalism	OK	Bled air from system
IW-2	"	OK	
IW-3	"	OK	
IW-4	"	OK	
IW-5	"	OK	
IW-6	"	OK	
IW-7	"	OK	
IW-8	"	OK	
IW-9	"	OK	
IW-10	"	OK	

ITEM	NORMAL CONDITION	INSPECTED CONDITION	COMMENTS
	No abnormal surface water, ponding or soft areas over pipelines	(Normal or Needs Repair)	Repair Requires (2)
	"	RW-1 Normal	
	"	RW-2 Normal	
	"	RW-3	
	"	RW-4 Normal	
	"	RW-5 Normal	
	"	RW-6 Normal	
	"	RW-7 Normal	
	"	RW-8 Normal	

WEEKLY INSPECTION CHECKLIST
SCRDI-BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

DATE: November 1st, 2007

TIME IN: 0620 TIME OUT: 1710

WEATHER CONDITIONS: overcast, drizzle, cool

APPROXIMATE TEMPERATURE: 49°F

NAME/OPERATOR: James S. Ingles

SIGNATURE: _____

CERTIFICATION #: _____ #05525

Well Recovery Information

ITEM	PUMP OPERATIONAL (Yes/No)	NORMAL CONDITION	FLOW RATE (gpm)	TOTAL FLOW (gpm)
RW-1 (FQI-1)	<u>Yes</u>	15 to 25 gpm	<u>15</u>	<u>39458466</u>
RW-2 (FQI-2)	<u>Yes</u>	20 to 25 gpm	<u>19</u>	<u>85598129</u>
RW-3 (FQI-3)	<u>No</u>	20 to 25 gpm	<u>0</u>	<u>178640</u>
RW-4 (FQI-4)	<u>Yes</u>	10 to 20 gpm	<u>19</u>	<u>89656783</u>
RW-5 (FQI-5)	<u>Yes</u>	20 to 25 gpm	<u>25</u>	<u>9596441</u>
RW-6 (FQI-6)	<u>Yes</u>	40 to 50 gpm	<u>36</u>	<u>76410498</u>
RW-7 (FQI-7)	<u>Yes</u>	5 to 10 gpm	<u>7</u>	<u>33793899</u>
RW-8 (FQI-8)	<u>Yes</u>	5 to 10 gpm	<u>17</u>	<u>4501904</u>

Well Injection Information

ITEM	NORMAL CONDITION	FLOW RATE (gpm)	TOTAL FLOW (gpm)	PRESSURE READING PSI
IW-1 (FQI-23)	0 to 3 gpm	<u>12</u>	<u>46809102</u>	<u>16</u>
IW-2 (FQI-25)	0 to 8 gpm	<u>16</u>	<u>63871376</u>	<u>9</u>
IW-3 (FQI-27)	0 to 8 gpm	<u>19</u>	<u>68927939</u>	<u>18</u>
IW-4 (FQI-29)	0 to 8 gpm	<u>15</u>	<u>58921357</u>	<u>14</u>
IW-5 (FQI-31)	15 to 20 gpm	<u>15</u>	<u>67449416</u>	<u>15</u>
IW-6 (FQI-33)	25 to 35 gpm	<u>16</u>	<u>73519097</u>	<u>14</u>
IW-7 (FQI-35)	15 to 25 gpm	<u>14</u>	<u>73015286</u>	<u>15</u>
IW-8 (FQI-37)	20 to 30 gpm	<u>13</u>	<u>66508810</u>	<u>5</u>
IW-9 (FQI-39)	30 to 45 gpm	<u>15</u>	<u>68229885</u>	<u>17</u>
IW-10 (FQI-41)	10 to 32 gpm	<u>13</u>	<u>54157994</u>	<u>13</u>

Cleaned FIT-45 and FIT-46 Air Strippers + 2 Flow control valves.

TREATMENT SYSTEM
WEEKLY INSPECTION CHECKLIST
(Continued)

Well Recovery Information

TAG NO.	DESCRIPTION	DEVICE	UNITS	NORMAL VALUE	OBSERVED CONDITION	COMMENTS
F-1	Pressure across Duplex Filter No. 1	dPSH-19	psi	<20 psi	6 psi	Changed filter bags
TK-1	Influent Equalization Tank Level	LIT-9	inches	21.5-65.4	29.43 in.	
P-1	Stripper Feed Pump Discharge Pressure	PI-11	psi	15 psi	12.5 psi	
	Flow to Air Strippers	FIT-45 Total	gpm gallons	80 gpm	70	13893465
		FIT-46 Total	gpm gallons		70	22210951
B-1	Blower No. 1 Discharge Pressure	Pressure Gauge	Inches wc	15 to 25	24	
B-2	Blower No. 2 Discharge Pressure	Pressure Gauge	Inches wc	15 to 25	24	
S-1	Air Stripper No. 1	Trouble Alarm	off		off	
S-2	Air Stripper No. 2	Trouble Alarm	off		off	
P-2	Transfer Pump Discharge Pressure	PI-17 ABB Drive ABB Drive Motor Temp	PSI Hertz ops time P-2 (on motor)	35 to 58 psi 30 Hrs/Min 90-160°F	40 36.64 79811 80°F 90°F	
P-2	Pressure across Duplex Filter No. 2	dPSH-49	psi	<20 psi	6 psi	Changed filter bags
C-1	Carbon Unit No. 1	Pressure Gauge	psi		20 psi	
C-2	Carbon Unit No. 2	Pressure Gauge	psi		25 psi	
CTI	Header	Pressure PSI	psi		12 psi	
S-1	Sump	Level	by sight	1/2 full 1/4 full 3/4 full	Empty	Pumped down and cleaned.

* checked sump level controller calibration (OK)

TREATMENT SYSTEM - WEEKLY INSPECTION CHECKLIST (Continued)

Operating Equipment Items:

Tag No.	Description	MAINTENANCE REQUIREMENT	COMPLETED (Yes/No)
P-1	Stripper Feed Pump	Check level of lubricant (change every 1,000 hrs)	Yes
P-3	Sump Pump (Hand Switch)	Confirm operation	Yes

Filter Bag Changes:

FILTER	BAG CHANGED (Yes/No)	New Filter Size	APPEARANCE OF OLD FILTER
F-1	Yes	Same	Very Dirty (Fe)
F-2	Yes	Same	Very Dirty (Fe)

COLLECTION SYSTEM - WEEKLY INSPECTION CHECKLIST

ITEM	NORMAL CONDITION	INSPECTED CONDITION	COMMENTS
Injection Wells:			
IW-1	Locked, no leaks, mounding or signs of vandalism	OK	
IW-2	"	OK	
IW-3	"	OK	
IW-4	"	OK	Some flooding due to rain.
IW-5	"	OK	
IW-6	"	OK	
IW-7	"	OK	
IW-8	"	OK	
IW-9	"	OK	
IW-10	"	OK	

ITEM	NORMAL CONDITION	INSPECTED CONDITION	COMMENTS
	No abnormal surface water, ponding or soft areas over pipelines	(Normal or Needs Repair)	Repair Requires (2)
	"	RW-1 Normal	
	"	RW-2 Normal	
	"	RW-3 N/A	offline since startup
	"	RW-4 Normal	
	"	RW-5 Normal	
	"	RW-6 Normal	
	"	RW-7 Normal	
	"	RW-8 Normal	

WEEKLY INSPECTION CHECKLIST
SCRDI-BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

DATE: Jan 28, 2008

TIME IN: 0800 TIME OUT: 1700 TO DIX

WEATHER CONDITIONS: Clear and Cool No Precip.

APPROXIMATE TEMPERATURE: 42°

NAME/OPERATOR: James S. Ingles

SIGNATURE: [Signature]

CERTIFICATION #: #05535

Well Recovery Information

ITEM	PUMP OPERATIONAL (Yes/No)	NORMAL CONDITION	FLOW RATE (gpm)	TOTAL FLOW (gpm)
RW-1 (FQI-1)	<u>N</u>	15 to 25 gpm	<u>0</u>	<u>39458631</u>
RW-2 (FQI-2)	<u>Y</u>	20 to 25 gpm	<u>23</u>	<u>87743684</u>
RW-3 (FQI-3)	<u>N</u>	20 to 25 gpm	<u>0</u>	<u>178640</u>
RW-4 (FQI-4)	<u>Y</u>	10 to 20 gpm	<u>21</u>	<u>91980189</u>
RW-5 (FQI-5)	<u>Y</u>	20 to 25 gpm	<u>26</u>	<u>12272338</u>
RW-6 (FQI-6)	<u>Y</u>	40 to 50 gpm	<u>35</u>	<u>79352166</u>
RW-7 (FQI-7)	<u>Y</u>	5 to 10 gpm	<u>6</u>	<u>34386315</u>
RW-8 (FQI-8)	<u>Y</u>	5 to 10 gpm	<u>16</u>	<u>5817187</u>

Well Injection Information

ITEM	NORMAL CONDITION	FLOW RATE (gpm)	TOTAL FLOW (gpm)	PRESSURE READING PSI
IW-1 (FQI-23)	0 to 3 gpm	<u>15</u>	<u>48049642</u>	<u>12</u>
IW-2 (FQI-25)	0 to 8 gpm	<u>17</u>	<u>69513675</u>	<u>10</u>
IW-3 (FQI-27)	0 to 8 gpm	<u>16</u>	<u>70627530</u>	<u>11</u>
IW-4 (FQI-29)	0 to 8 gpm	<u>12</u>	<u>60412732</u>	<u>13</u>
IW-5 (FQI-31)	15 to 20 gpm	<u>13</u>	<u>68907260</u>	<u>15</u>
IW-6 (FQI-33)	25 to 35 gpm	<u>12</u>	<u>75122140</u>	<u>13</u>
IW-7 (FQI-35)	15 to 25 gpm	<u>10</u>	<u>74375405</u>	<u>13</u>
IW-8 (FQI-37)	20 to 30 gpm	<u>11</u>	<u>67831561</u>	<u>11</u>
IW-9 (FQI-39)	30 to 45 gpm	<u>12</u>	<u>69747313</u>	<u>14</u>
IW-10 (FQI-41)	10 to 32 gpm	<u>13</u>	<u>55090192</u>	<u>7</u>

* System repair and restart. Bled built up air from treatment system.
 Repaired RW-4. Replaced heater. Restarted Pump.

TREATMENT SYSTEM
WEEKLY INSPECTION CHECKLIST
(Continued)

Well Recovery Information

TAG NO.	DESCRIPTION	DEVICE	UNITS	NORMAL VALUE	OBSERVED CONDITION	COMMENTS
F-1	Pressure across Duplex Filter No. 1	dPSH-19	psi	<20 psi	8 psi	
TK-1	Influent Equalization Tank Level	LIT-9	inches	21.5-65.4	42.13 in	
P-1	Stripper Feed Pump Discharge Pressure	PI-11	psi	15 psi	12.5 psi	
	Flow to Air Strippers	FTT-45 Total	gpm gallons	80 gpm	62 gpm	20127685
		FTT-46 Total	gpm gallons		62 gpm	28384739
B-1	Blower No. 1 Discharge Pressure	Pressure Gauge	Inches wc	15 to 25	26 in wc	
B-2	Blower No. 2 Discharge Pressure	Pressure Gauge	Inches wc	15 to 25	26 in wc	
S-1	Air Stripper No. 1	Trouble Alarm	off		off	
S-2	Air Stripper No. 2	Trouble Alarm	off		off	
P-2	Transfer Pump Discharge Pressure	PI-17 ABB Drive ABB Drive Motor Temp	PSI Hertz ops time P-2 (on motor)	35 to 58 psi 30 Hrs/Min 90-160°F	37.72 hrz 15927 90°F 100°F	
P-2	Pressure across Duplex Filter No. 2	dPSH-49	psi	<20 psi	8 psi	
C-1	Carbon Unit No. 1	Pressure Gauge	psi		22 psi	
C-2	Carbon Unit No. 2	Pressure Gauge	psi		25 psi	
CTI	Header	Pressure PSI	psi		14 psi	
S-1	Sump	Level	by sight	1/4 full 1/4 full 1/4 full	1/4 full	

TREATMENT SYSTEM - WEEKLY INSPECTION CHECKLIST (Continued)

Operating Equipment Items:

Tag No.	Description	MAINTENANCE REQUIREMENT	COMPLETED (Yes/No)
P-1	Stripper Feed Pump	Check level of lubricant (change every 1,000 hrs)	Y
P-3	Sump Pump (Hand Switch)	Confirm operation	Y

Filter Bag Changes:

FILTER	BAG CHANGED (Yes/No)	New filter size	APPEARANCE OF OLD FILTER
F-1	N		
F-2	N		

COLLECTION SYSTEM - WEEKLY INSPECTION CHECKLIST

ITEM	NORMAL CONDITION	INSPECTED CONDITION	COMMENTS
Injection Wells:			
IW-1	Locked, no leaks, mounding or signs of vandalism	OK	
IW-2	"	OK	
IW-3	"	OK	
IW-4	"	OK	
IW-5	"	OK	
IW-6	"	OK	
IW-7	"	OK	
IW-8	"	OK	
IW-9	"	OK	
IW-10	"	OK	Need to fill in settled dirt.

ITEM	NORMAL CONDITION	INSPECTED CONDITION	COMMENTS
No abnormal surface water, ponding or soft areas over pipelines		(Normal or Needs Repair)	Repair Requires (2)
	"	RW-1 Normal	
	"	RW-2 Normal	Need to fill in settled dirt next to concrete pad
	"	RW-3 Off	
	"	RW-4 Normal	
	"	RW-5 Normal	
	"	RW-6 Normal	
	"	RW-7 Normal	
	"	RW-8 Normal	

ATTACHMENT E

Summary of Groundwater Data 1996-2007
Monitoring and Recovery Well Data

Five Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: SCRDI Bluff Road	Date of inspection: 15 April 2008
Location and Region: 5800 Bluff Road (Hwy 48) Columbia, South Carolina in Richland County EPA Region 4	EPA ID: SCD000622787
Agency, office, or company leading the five-year review: EPA and de maximis, inc.	Weather/temperature: Warm and sunny
Remedy Includes: (Check all that apply) <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> <input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ </div> <div style="width: 45%;"> <input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls </div> </div>	
Attachments: <input type="checkbox"/> Inspection team roster attached <input checked="" type="checkbox"/> Site map attached	
II. INTERVIEWS (Check all that apply)	
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;"> <p>1. O&M site manager <u>Dan Garrigan</u></p> <p style="text-align: center; margin-left: 150px;">Name</p> </div> <div style="width: 45%;"> <p style="text-align: center;"><u>O&M, Inc.</u></p> <p style="text-align: center;"><u>Project manager</u></p> <p style="text-align: center; margin-left: 150px;">Title</p> </div> <div style="width: 10%; text-align: center;"> <p><u>various</u></p> <p style="margin-top: 10px;">Date</p> </div> </div> <p>Interviewed <input type="checkbox"/> at site <input checked="" type="checkbox"/> at office <input checked="" type="checkbox"/> by phone Phone no. <u>865 691 6254</u></p> <p>Problems, suggestions; <input type="checkbox"/> Report attached _____</p>	
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;"> <p>2. O&M staff <u>Scott Ingles</u></p> <p style="text-align: center; margin-left: 150px;">Name</p> </div> <div style="width: 45%;"> <p style="text-align: center;"><u>O&M, Inc.</u></p> <p style="text-align: center;"><u>Site Operator</u></p> <p style="text-align: center; margin-left: 150px;">Title</p> </div> <div style="width: 10%; text-align: center;"> <p><u>various</u></p> <p style="margin-top: 10px;">Date</p> </div> </div> <p>Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input checked="" type="checkbox"/> by phone Phone no. <u>803 530 5090</u></p> <p>Problems, suggestions; <input type="checkbox"/> Report attached _____</p>	

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
 Contact _____

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached			

Agency _____
 Contact _____

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached			

Agency _____
 Contact _____

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached			

Agency _____
Contact _____

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached			

4. **Other interviews (optional)** ☐ Report attached.

[illegible]

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	O&M Documents <input checked="" type="checkbox"/> O&M manual <input checked="" type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	Site-Specific Health and Safety Plan <input checked="" type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	O&M and OSHA Training Records Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
4.	Permits and Service Agreements <input checked="" type="checkbox"/> Air discharge permit <input checked="" type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits Remarks _____	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
5.	Gas Generation Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
6.	Settlement Monument Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
7.	Groundwater Monitoring Records Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	Leachate Extraction Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
9.	Discharge Compliance Records <input checked="" type="checkbox"/> Air <input checked="" type="checkbox"/> Water (effluent) Remarks <i>Air and water (effluent) discharge is reported monthly via site monthly progress report</i>	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
10.	Daily Access/Security Logs Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A

IV. O&M COSTS

1. O&M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☒ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other Contractor is O&M, Inc

2. O&M Cost Records

- ☒ Readily available ☒ Up to date *O&M costs are paid by PRPs.*
☒ Funding mechanism/agreement in place *Site O&M contractor works for the PRPs.*
 Original O&M cost estimate \$306,875 ☐ Breakdown attached

Total annual cost by year for review period if available

From _____	To <u>Annual cost is < \$220,000</u>	<input type="checkbox"/> Breakdown attached
Date Date	Total cost	
From _____	To _____	<input type="checkbox"/> Breakdown attached
Date Date	Total cost	
From _____	To _____	<input type="checkbox"/> Breakdown attached
Date Date	Total cost	
From _____	To _____	<input type="checkbox"/> Breakdown attached
Date Date	Total cost	
From _____	To _____	<input type="checkbox"/> Breakdown attached
Date Date	Total cost	

3. Unanticipated or Unusually High O&M Costs During Review Period

Describe costs and reasons: None

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☐ N/A

A. Fencing

1. Fencing damaged ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks Site gate and fencing is only at site property at Bluff Road and is not continuous around properties being remediated by groundwater pump and treat. Site operator reported no site vandalism in 10 years

B. Other Access Restrictions

1. Signs and other security measures ☐ Location shown on site map ☐ N/A

Remarks _____

C. Institutional Controls (ICs)**1. Implementation and enforcement**

Site conditions imply ICs not properly implemented

☐ Yes ☐ No ☒ N/A

Site conditions imply ICs not being fully enforced

☐ Yes ☐ No ☒ N/A

Type of monitoring (e.g., self-reporting, drive by) _____

Frequency _____

Responsible party/agency _____

Contact _____

Name

Title

Date

Phone no.

Reporting is up-to-date

☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency

☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met

☐ Yes ☐ No ☒ N/A

Violations have been reported

☐ Yes ☐ No ☒ N/AOther problems or suggestions: ☐ Report attached

PRPs have site access agreement for properties bordering site property. Access agreement prohibits shallow groundwater use unless agreed to by PRPs

2. Adequacy☐ ICs are adequate☐ ICs are inadequate☒ N/A

Remarks _____

D. General**1. Vandalism/trespassing**☐ Location shown on site map☒ No vandalism evident

Remarks _____

2. Land use changes on site ☒ N/A

Remarks _____

3. Land use changes off site ☒ N/A

Remarks _____

VI. GENERAL SITE CONDITIONS**A. Roads**☒ Applicable☐ N/A**1. Roads damaged**☐ Location shown on site map☒ Roads adequate☐ N/A

Remarks _____

8.	Wet Areas/Water Damage <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks _____	<input type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Location shown on site map Areal extent _____
9.	Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability Areal extent _____ Remarks _____	
B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	Flows Bypass Bench Remarks _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
2.	Bench Breached Remarks _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement Areal extent _____ Depth _____ Remarks _____	
2.	Material Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation Material type _____ Areal extent _____ Remarks _____	
3.	Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion Areal extent _____ Depth _____ Remarks _____	

4.	Undercutting Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Depth _____	<input type="checkbox"/> No evidence of undercutting
5.	Obstructions Type _____ <input type="checkbox"/> Location shown on site map Size _____ Remarks _____	<input type="checkbox"/> No obstructions Areal extent _____	
6.	Excessive Vegetative Growth Type _____ <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Remarks _____	Areal extent _____	
D. Cover Penetrations <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Gas Vents <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> N/A Remarks _____	<input type="checkbox"/> Active <input type="checkbox"/> Functioning <input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Passive <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance
2.	Gas Monitoring Probes <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Evidence of leakage at penetration Remarks _____	<input type="checkbox"/> Functioning <input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A
3.	Monitoring Wells (within surface area of landfill) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Evidence of leakage at penetration Remarks _____	<input type="checkbox"/> Functioning <input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A
4.	Leachate Extraction Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Evidence of leakage at penetration Remarks _____	<input type="checkbox"/> Functioning <input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A
5.	Settlement Monuments Remarks _____	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed <input checked="" type="checkbox"/> N/A

E. Gas Collection and Treatment			<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Treatment Facilities <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____			
2.	Gas Collection Wells, Manifolds and Piping <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____			
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____			
F. Cover Drainage Layer			<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Outlet Pipes Inspected <input type="checkbox"/> Functioning <input checked="" type="checkbox"/> N/A Remarks _____			
2.	Outlet Rock Inspected <input type="checkbox"/> Functioning <input checked="" type="checkbox"/> N/A Remarks _____			
G. Detention/Sedimentation Ponds			<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Siltation Areal extent _____ Depth _____ <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____			
2.	Erosion Areal extent _____ Depth _____ <input type="checkbox"/> Erosion not evident Remarks _____			
3.	Outlet Works <input type="checkbox"/> Functioning <input checked="" type="checkbox"/> N/A Remarks _____			
4.	Dam <input type="checkbox"/> Functioning <input checked="" type="checkbox"/> N/A Remarks _____			

H. Retaining Walls		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Deformations Horizontal displacement _____ Rotational displacement _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident	<input type="checkbox"/> Deformation not evident Vertical displacement _____
2.	Degradation Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Degradation not evident	
I. Perimeter Ditches/Off-Site Discharge		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Siltation Areal extent _____ Depth _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident	
2.	Vegetative Growth <input type="checkbox"/> Vegetation does not impede flow Areal extent _____ Type _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A	
3.	Erosion Areal extent _____ Depth _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident	
4.	Discharge Structure Remarks _____	<input type="checkbox"/> Functioning <input checked="" type="checkbox"/> N/A	
VIII. VERTICAL BARRIER WALLS		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Settlement Areal extent _____ Depth _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident	
2.	Performance Monitoring Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ Head differential _____ Remarks _____		

IX. GROUNDWATER/SURFACE WATER REMEDIES <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
A. Groundwater Extraction Wells, Pumps, and Pipelines <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1.	Pumps, Wellhead Plumbing, and Electrical <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____
3.	Spare Parts and Equipment <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____
B. Surface Water Collection Structures, Pumps, and Pipelines <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____
3.	Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____

C. Treatment System		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Treatment Train (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input checked="" type="checkbox"/> Air stripping <input checked="" type="checkbox"/> Carbon adsorbers <input checked="" type="checkbox"/> Filters <u>Poly bag filter units</u> <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) <input type="checkbox"/> Others <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> Sampling ports properly marked and functional <input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date <input checked="" type="checkbox"/> Equipment properly identified <input checked="" type="checkbox"/> Quantity of groundwater treated annually <u>approx. 60 million gallons</u> <input type="checkbox"/> Quantity of surface water treated annually Remarks		
2.	Electrical Enclosures and Panels (properly rated and functional) <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks		
3.	Tanks, Vaults, Storage Vessels <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks		
4.	Discharge Structure and Appurtenances <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks		
5.	Treatment Building(s) <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input checked="" type="checkbox"/> Chemicals and equipment properly stored Remarks		
6.	Monitoring Wells (pump and treatment remedy) <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks <u>selected number of monitoring wells are sampled semi-annually</u>		
D. Monitoring Data			
1.	Monitoring Data <input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality		
2.	Monitoring data suggests: <input checked="" type="checkbox"/> Groundwater plume is effectively contained <input checked="" type="checkbox"/> Contaminant concentrations are declining		

D. Monitored Natural Attenuation**1. Monitoring Wells (natural attenuation remedy)**☐ Properly secured/locked☐ Functioning☐ Routinely sampled☐ Good condition☐ All required wells located☐ Needs Maintenance☒ N/A

Remarks _____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS**A. Implementation of the Remedy**

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Refer to text in five year review report

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Refer to text of this five year review report

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

Refer to text in five year review report

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Refer to text in five year review report

ATTACHMENT G

Public notice in Columbia newspaper, 'The State'



THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Announces a

2nd Five-Year Review

For the

SCRDI Bluff Road Superfund Site

A 2nd Five-Year Review is being conducted by the U.S. Environmental Protection Agency (EPA) of the cleanup up activities taken at the SCRDI Bluff Road Superfund Site located in Columbia, Richland County, South Carolina. The purpose of this review is to evaluate the implementation and performance of the remedy in order to determine if the remedy is protective of human health and the environment. When completed, a copy of the review report will be placed in the Information Repository files located in the EPA Record Center, 11th Floor, 61 Forsyth Street, S.W. Atlanta, GA 30303, and the Richland County Public Library, 7421 Garners Ferry Road, Columbia, SC 20209.

EPA will also conduct a number of interviews with nearby businesses, residents, local officials, state officials, and others to obtain their opinion on the cleanup process.

The community can contribute during this review by providing comments or questions. The scheduled date of completion for the five-year review is April 29, 2008. If you would like to speak with us about this Site, please call Linda Starks, EPA Community Involvement Coordinator at (404) 562-8487. If you have any technical questions, please contact Steven Sandler, EPA Remedial Project Manager at (404) 562-8818.